

September-October 1993

# PROGRAM MANAGER

*Journal of the Defense Systems Management College*

Acquisition Reform Underway at Pentagon

DSMC/FAA Interagency Agreement

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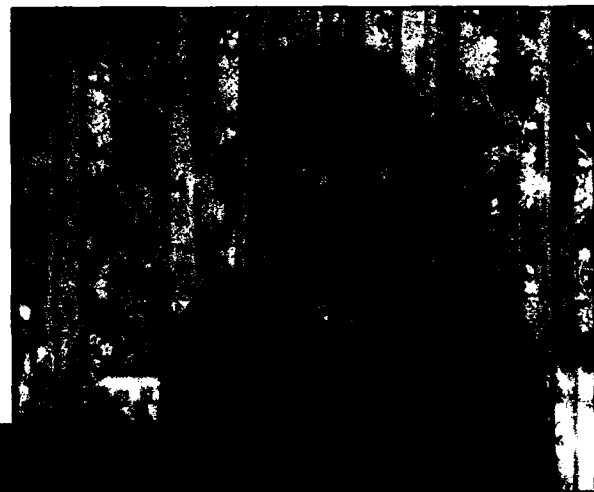
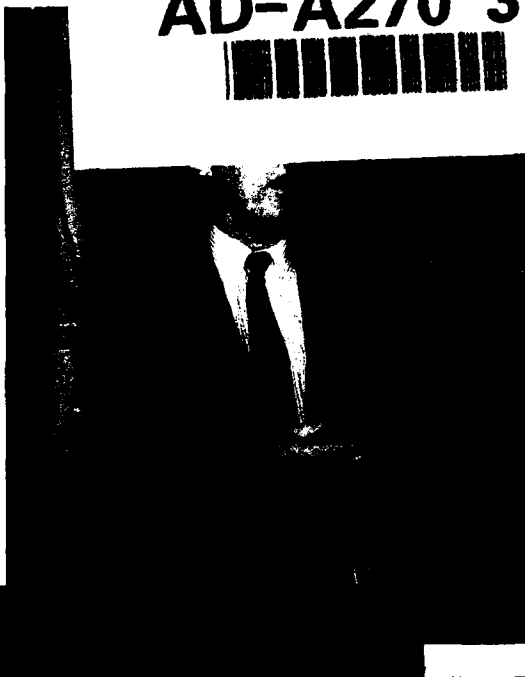
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## The DOD Acquisition Leadership



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# PROGRAM MANAGER

*Journal of the Defense Systems Management College*

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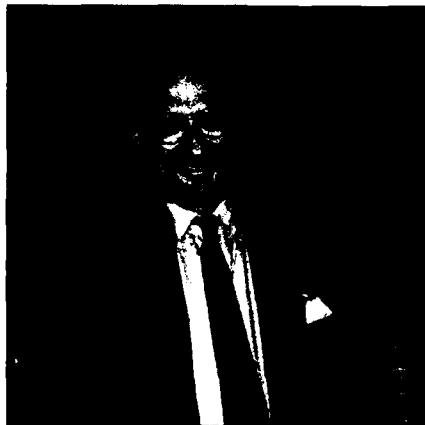
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Whenever masculine nouns or pronouns appear, other than with obvious reference to named male individuals, they have been used for literary purposes and are meant in their generic sense.



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*Catherine M. Clark*

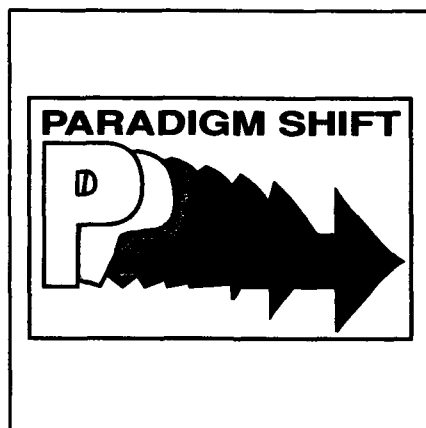
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Manuscripts, Letters to the Editor, and other correspondence are welcome and should be addressed to the DSMC Press. Inquiries concerning proposed articles may be made by phone at (703) 805-2892/3056 or DSN 655-2892/3056.



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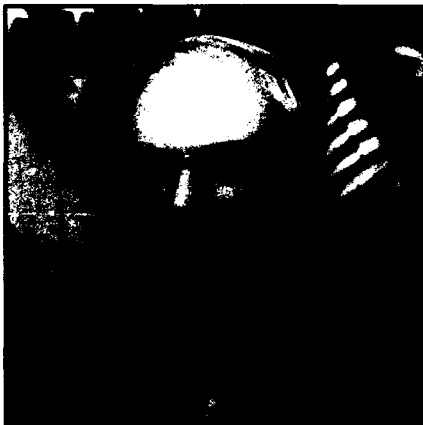


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**DTIC QUALITY INSPECTED**

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# DOD ACQUISITION REFORM

## Underway at Pentagon

Catherine M. Clark  
Managing Editor

**"M**aintaining Acquisition Excellence with Declining Resources," theme of the 10th annual Program Managers Symposium sponsored by the Defense Systems Management College (DSMC) Alumni Association, brought more than 225 people from government and industry to the DSMC campus.

Deputy Secretary of Defense William J. Perry spoke on "A New DOD Acquisition Strategy." He was introduced by the DSMC Commandant, Brigadier General (Select) Claude M. Bolton, Jr., USAF, who invited everyone to "step back and ask questions."

Dr. Perry addressed elements of the new acquisition reform program in the Department of Defense (DOD). "Changes are taking place like a flood tide and DOD must not be swept away but, instead, take the current," he said.

Actions are underway to combine defense and industrial bases into one industrial acquisition reform program, saving tens of billions of dollars during the next five years. "It won't be done overnight," he explained.

Several "tools" will be used, like industrial specifications instead of military ones, and simplified procurement procedures.

### Better Processes

The reorganization of DOD, under Defense Secretary Les Aspin, is ex-

pected to provide better processes of acquisition reform, environmental security, advanced technology demonstration management, logistics and economic security.

Dr. John M. Deutch, Under Secretary of Defense (Acquisition and Technology), formerly Under Secretary of Defense for Acquisition, reports to Dr. Perry. Dr. Deutch is charged with preparations for the Defense Acquisition Board and daily issues concerning acquisition. (See *Program Manager*, July-August 1993, p. 2.)

### New Positions

Mrs. Colleen A. Preston, who fills the new post, Deputy Under Secretary of Defense (Acquisition Reform), spoke on "The New OSD Acquisition Organization, Functions and Initiatives." She said "we can't do tomorrow's job with today's system and "we must focus on how to reorient and reengineer." She is identifying and implementing ways to make the acquisition process more efficient. (See story page 4.)

Another new post, Assistant Secretary of Defense for Economic Security, is charged for economic reinvestment, base closure and realignment, industrial base issues and international programs. Reporting to this office will be the new Office of Economic Adjustment (formerly the Office of the Secretary of Defense for Force Management and Personnel).



1. Mr. Gerald E. Keightley, Executive Director, Defense Acquisition University.  
2. Dr. John M. Deutch, Under Secretary of Defense (Acquisition and Technology).

## Among Positions Under DUSD(A&T)

Environmental Security handles environmental issues and installations; Advanced Technology monitors ballistic missile defense technology and the Pentagon's seven other thrust areas; and, Defense for Logistics oversees all logistics questions.

The Director of Defense Research and Engineering will handle scientific issues, basic and applied research, and laboratory research and management; The Director of the Advanced Research Projects

Agency (formerly DARPA) will report to this official.

The Assistant to the Secretary of Defense for Atomic Energy will supervise the On-Site Inspection Agency and the Defense Nuclear Agency. (See Chart, *Program Manager*, July-August 1993, pp. 28-29.)

## Defense Acquisition University

Gerald E. Keightley, Executive Director of the new Defense Acquisition University, described its role in acquisition and certification; i.e., struc-

ture resources, education and training and research and publications. (See story this page.)

During the July symposium, panels addressed "Implementing the New Acquisition Strategy—Acquisition Executives' Perspectives"; "A Report from the Acquisition Law Review Panel"; and, Acquisition Education and Certification—How the Services Are Doing."

Edward C. Robinson, the symposium chairman, succeeds Charles Tringali as the DSMC Alumni President.

The Alumni Association Office is located at 7731 Tuckerman Lane, Suite 131 Potomac, MD 20854; (301) 309-9125; FAX (301) 309-0817.

## 37,000 STUDENTS

## KEIGHTLEY OUTLINES DAU ROLE

Robert W. Ball

An estimated 37,000 students will attend one or more of 1,000 offerings of 50 mandatory acquisition related courses taught at 16 schools making up the Defense Acquisition University (DAU) consortium in FY 1994.

Gerald E. Keightley, DAU Executive Director, told several hundred people attending the DSMC Alumni Association's 10th Anniversary Symposium here in July that 16 Department of Defense Schools and commands make up the DAU consortium.

The DAU is a result of the Defense Acquisition Workforce Improvement Act. The 16 schools will educate and train acquisition personnel in 12 career fields: Program Management; Communications/Computer Systems; Industrial Property Management; System Planning, Research, Development and Engineering; Contracting; Purchasing/Procurement; Test and Evaluation Engineering; Quality Assurance; Manufacturing and Production; Acquisition Logistics; Business, Cost Estimating and Financial Management, and Auditing.

Mr. Keightley told the DSMC Alumni that each acquisition position is identified at a Level (I, II, III) and a career field. "Each level within a career field has mandatory education, training and experience requirements which must be met by people seeking certification in the Defense Acquisition Corps," he said. Individuals may be certified in multiple career fields.

To meet Acquisition Corps requirements, an individual must be a GM-

(continued on page 5)

Photos by Richard Mattox.



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3. Mrs. Colleen A. Preston, Deputy Under Secretary of Defense (Acquisition Reform).

4. The Honorable William I. Perry, Deputy Secretary of Defense.

# COLLEEN PRESTON EXPLAINS "WHERE WE'RE GOING"

*Esther M. Farria*  
Associate Editor

**I**n a luncheon address to the Defense Systems Management College Alumni Association on July 9, at the Fort Belvoir Officers Club, Mrs. Colleen A. Preston, Deputy Under Secretary of Defense (Acquisition Reform) (DUSD(AR)), spoke on "where we'll be going with acquisition reform."

Mrs. Preston stated the need for acquisition reform is a result of a declining budget and changes in global technology. She said we will maintain readiness but to pay for priorities there must be cuts in areas including infrastructure and production cost. A reduction in the acquisition workforce is possible, as well.

## Commercial Companies

To "reduce costs but to ensure we maintain our technological superiority, we must be able to acquire state-of-the-art technology on a timely basis and from commercial companies," said Mrs. Preston. She stated many needs no longer exist. Redesign is nec-

essary to reduce costs and we must consider adopting commercial practices. Her official focus is on reorienting business practices.

Mrs. Preston feels ideas for change will come from the acquisition community. Developing integrated action teams with input from industry and others will help develop an implementation plan.

Short-term initiative "priority actions" are the first steps of a comprehensive package of acquisition reform. These actions include developing a DOD position on acquisition of commercial products. The ultimate goal is to "move away" from the DOD process now used. She advocates streamlining procedures for developing regulations and sharing best practices to avoid duplication of effort.

## Senior Steering Group

Mrs. Preston's office will be the "focal point for restructuring and im-

proving the acquisition process by directing the conception, development, adoption, implementation, and institutionalization of new and innovative policies and processes that meet the principles of the new acquisition system."

The DUSD(AR) will use a Senior DOD Steering Group and will establish a dialogue with the Congress to help determine how to implement the transition to the new acquisition system. This is not meant to replace the efforts of the offices of the Secretary of Defense, the military departments or the defense agencies to make the existing system function more effectively and continue to implement policies, practices and changes to improve the system. These offices, departments and agencies will coordinate with DUSD(AR) to ensure changes are consistent with approaches pursued by the Acquisition Reform office.

Photo by Mark Huard



**Legion of Merit...**Dr. John M. Deutch, Under Secretary of Defense (Acquisition and Technology), presents the Legion of Merit to Brigadier General (Select) Claude M. Bolton, Jr., USAF, DSMC Commandant. Bolton received the award for exceptionally meritorious conduct in the performance of outstanding services as Program Director, Advanced Cruise Missile System Program Office, Aeronautical Systems Center, and as Inspector General, Headquarters Air Force Materiel Command.

# DEFENSE SYSTEMS ACQUISITION MANAGEMENT PROCESS CHART UPDATED

The Defense Systems Acquisition Management Process Chart (DSMC Chart CORP: 2007 of May 1992) was created as an integration vehicle and training aid for the Acquisition Basics Course (now Intermediate Systems Acquisition Course). The chart serves as a roadmap of functional activities throughout the systems life cycle and is available to all DSMC course attendees and the acquisition community.

Response to the Chart in its first year of publication has been overwhelming. More than half of the DSMC courses have voluntarily adopted it. It is distributed in the AFIT Systems 100 Course and used at the Army Logistics Management College, Army Engineer School, AFOTEC OT&E Course (Kirtland AFB), University of Maryland, Computer Science School (Fort Gordon), University of Southern California, and others.

In less than one year, 25,000 copies have been distributed at customer request. A list has also been established identifying users.

A recent update for reprinting reflects minor changes; hence, the previous chart remains viable. The DSMC Chart CORP: 2008 should be available in early September 1993.

For copies, contact:

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FT BELVOIR VA 22060-5565  
(703) 805-2376; DSN 655-2376

Mr. John L. Etherton, Professional Staff member to the Senate Armed Services Committee, was a luncheon speaker at the Alumni Association Symposium. His subject was "Congress and DOD Acquisition - A Current Perspective." He talked about the budget process, subcommittee assignment and acquisition reform.

Photo by Richard Mattox.



(DAU Role continued from page 3)

13/O-4 or higher and have a baccalaureate degree plus 24 credits in management-related courses or 24 credits in field plus 12 management-related course credits. Four years of acquisition position experience are required. Completion of Level II training is required and civilians must sign a mobility agreement.

"The estimated budget for FY 94 is nearly \$40 M more than the FY 93 budget," Keightley said. "The number of students will jump nearly 10,000 and the number of course offerings an estimated 1,100, up from 944 in FY 93," he said.

The defense acquisition workforce is approximately 130,000.

The DAU central office consists of three divisions under the President and Executive Director: Resource Management, Academic Affairs and University Operations.

Resource Management is responsible for funding and quota allocation (assigns quotas and monitors registration and graduation processes).

Academic Affairs is responsible for the education and training. It offers

joint, competency based, acquisition courses in the 12 career fields.

University Operations include developing research and publication capabilities in acquisition and the establishment of a structure to provide for research and analysis of defense acquisition policy issues.

The DSMC and a 1-year acquisition course at the Industrial College of the Armed Forces (ICAF) are, by Title 10 mandate, part of DAU.

The following schools are part of DAU when they teach mandatory acquisition courses: Air Force Institute of Technology (AFIT); Army Logistics Management College (ALMC); Army Management Engineering College (AMEC); Defense Contract Audit Institute (DCAI); Defense Logistics Civilian Personnel Support Office (DLACPO); European Command Contracting Training Office (EUCOM); Information Resources Management College (IRMC); Lowry Technical Training Center; Naval Postgraduate School (NPS); Naval Supply Systems Command Regional Contracting Centers (NAVSUP); Naval Facilities Contracts Training Center (NFAC); Naval Warfare Assessment Center (NWAC); Navy Acquisition Management Training Office (NAMTO), and the Office of the Assistant Secretary of The Navy, (ASN(RDA)).

# DSMC/FAA INTERAGENCY AGREEMENT:

## "Kicked Off" July 26

Tony Rymiszewski

**T**he Defense Systems Management College (DSMC) has entered into an Interagency Agreement (IA) with the Federal Aviation Administration (FAA) to provide acquisition employees with program management resource development. This project was officially "kicked off" at DSMC on July 26, 1993.

During the five-year term of this agreement, DSMC will develop systems acquisition curriculum and facilitate short courses based on FAA case studies and lessons learned. Program management personnel in FAA Systems Acquisition will be instructed using FAA case studies and current Department of Transportation (DOT) and FAA orders and directives.

The FAA training will be comparable in curriculum design and content to that provided to DSMC short-course students. In place of the DOD 5000 documentation series, the DOD coordinated and DOT approved March 19, 1993, FAA Order 1810.1F, "Acquisition Policy" and corresponding

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*Mr. Rymiszewski, Professor of Engineering Management, wrote and negotiated the Interagency Agreement for Dr. Ben Rush, DSMC Dean of Faculty. Mr. Rymiszewski is presently Director of DSMC Corporate Planning.*



*Brigadier General (Select) Claude M. Bolton Jr., USAF, Commandant, Defense Systems Management College, signs an Interagency Agreement with the Federal Aviation Administration's John Turner, Associate Administrator for NAS Development (left), and Carolyn Blum, Associate Administrator for Contracting (right).*



DOT/FAA documents will be emphasized as study references used in the classroom and in FAA students' study guides/handouts.

The FAA's John Turner, Associate Administrator for NAS Development (AND), said at the IA signing: "We are pleased to formalize our association with DSMC because of its fine reputation in training DOD program management personnel...and we now have an opportunity to tailor this training to FAA experiences and capitalize on lessons learned."



Photo by Richard Mattox.

***...DSMC is proud  
to undertake this  
Interagency  
Agreement effort.  
It is DSMC's first  
attempt to  
undertake a long-  
term reimbursable  
commitment with a  
customer outside  
of DOD.***

Frances M. Valore, Professor of Financial Management, is assigned to manage this effort for DSMC. Mr. Turner designated Jeanne D. Rush, former Program Manager for FAA Weather Processors, as the on-site program manager and contracting officer technical representative. The joint project team will be colocated at DSMC and work under the counsel of Dr. Adelia E. Ritchie, Executive Director, DSMC Research and Information Division.

The first course offering at DSMC to FAA students is planned for early 1994 and will utilize a case-study approach for the Microwave Landing System (MLS) and two other FAA programs.

Interviews with former and current MLS program managers and multidisciplinary matrix personnel are underway. Other FAA unique program management tasks will be mutually selected for development by DSMC upon completion of this initial task.

## **PROGRAM MANAGER'S NOTEBOOK UPDATES AVAILABLE**

*Program Manager's Notebook* revised and new fact sheets have been published.

If you completed and mailed the request form in the May-June 1993 issue of *Program Manager*, your packet will be mailed to you.

Government personnel may request these by writing to the DEFENSE SYST MGMT COLG, ATTN OSPR, 9820 BELVOIR ROAD, SUITE G38, FT BELVOIR VA 22060-5565. FAX: (703) 805-3857.

Nongovernment personnel may purchase the packet, Stock Number: 008-020-01302-1, by writing the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.

BGen(Sel) Claude M. Bolton, Jr., DSMC Commandant, expressed his strong support during the IA kick-off meeting stating that "...DSMC is proud to undertake this Interagency Agreement effort. It is DSMC's first attempt to undertake a long-term reimbursable commitment with a customer outside of DOD."

Dr. Ben Rush, DSMC Faculty Dean, who initiated this effort as an in-house research project last fall, said, "This is a forward looking precedent and opens opportunities for DSMC to offer multi-disciplined program management staff capabilities to other federal agencies. The requirements are similar to our OSD customer-oriented systems acquisition educational training."

# A NEW PROGRAM MANAGER'S GUIDE TO PEOPLE

## *Or the Ben Hur Theory Of Personnel Management*

*Deanna J. Bennett*

**W**ell, they finally did it—made you the manager of an acquisition program. Look out DOD, here comes the best-run program ever. The user will be thrilled about the system your program produces and foreign military sales customers will hardly be able to wait for theirs. Not only will the system be fielded on time, it will be used by the DOD Comptroller as an ideal example of how to manage a program so it hits the cost target in the bull's-eye.

Wait a minute! Before you make plans to move into your castle in the air, how are you going to build it? Unless you're the Clark Kent of the acquisition program world, your staff will have to make this happen.

### **Facing Up to Change**

The first person you'll have to handle is yourself. Who are you? You're the program manager! Right? Whether you are initiating a new program or taking over an existing program, you are the precipitant of, and the person

who, manages an organizational change. Your assumption of program responsibility will cause unsettling effects of change on workers in your program.

Letting the program staff know how great you are won't be enough to get them to work as a good team. There are good techniques a new program manager can use to help individuals accept and adapt to the change. These same processes can be a vehicle for you to answer key questions about the new people making your program happen, and about how you should manage them.

These are reporter-type who, what, when, how questions. Who are these people? What talents do they bring to the program? What makes them tick as individuals? How can I best manage them to solve inevitable program problems? When are different managerial approaches called for?

The program manager getting the right answers and using them properly won't have to ask the last question: Why did I ever get into this job?

### **Managing Change**

Reaction to organizational change progresses through four phases:

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*Deanna J. Bennett is a Program Manager in the U.S. Special Operations Command, Research Development and Acquisition Center, MacDill AFB, Florida. She is a graduate of PMC 93-1.*



*You can fine-tune the team, a la Ben Hur.*

denial, resistance, exploration and commitment.<sup>1</sup> A new manager means being more than a cookie-cutter replacement for an old one. People understand that a new manager will want to leave a mark on the organization; making small or large changes on procedures, responsibilities, the way the program office interfaces with others.

The first reaction is denial: The "new guy" won't change anything and can't. The savvy manager should counter denial with personal information, what areas are being considered for improvement, any new program direction from the Defense Acquisition Board (DAB) or program executive officer, etc.<sup>2</sup>

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***By understanding  
how individuals in  
the program  
manager  
organization  
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relate to the  
outside world, you  
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team.***

.....



Once denial is overcome, resistance sets in. The prospect of change threatens feelings of competence and the organizational pecking order. The counter to resistance is to listen. Here's where the program manager can begin double duty with a single management technique: While attacking resistance to change, the program manager can craft the form the change will take. The key is in how to listen twice.

### **Pinpoint Problems**

First, listen to understand the substance of the concern. This may pinpoint problems with the organization and procedures. Then you can address "what" questions. What kind of technical, administrative and management skills does this person have? What do they think is not working in the organization (e.g., my area is fine, but such-and-such in someone else's area is broken)? What are their personal concerns?

At the same time listen to the kinds of substance and concerns voiced by each. This will feed your assessment based on the Myers-Briggs Type Indicator.<sup>3</sup> Here's where the "Ben-Hur theory" of personnel management comes in. Ben Hur could tell that a steady chariot horse should be an anchor on the inside, and a high-spirited, speedy horse on the outside.<sup>4</sup> By understanding how individuals in the program manager organization perceive, judge and relate to the outside world, you can fine-tune the team.

This helps answer the "who" questions. Who is best to handle/advise on what type of project or situation? Who should be where in the organization, ideally?

It won't be difficult in early discussions to identify the less socially oriented introvert and the outward focused extrovert. These may be easy traits to position on the team. You don't assign technology trade-off work

requiring extensive searching through journals and archival research to your extrovert engineer. You don't send the introvert to chat with potential program cosponsors at an Air Force user's conference.

### **Sensing and Intuition**

Perception modes can be equally useful to ascertain. Do the concerns you hear focus on practical pieces of the job (sensing), or where the whole program is going, and lack of vision of your predecessor (intuition)? Of your two financial managers/budget analysts, you would use the one high on the "sensing-end" of the scale to monitor the budget, and work the budget estimate submission and amended submission.

The "intuitior" is the one you would use for financial shortfalls to apply creativity in near-term reprogramming, and to play heavily in building your program objective memorandum (POM). Sensors and intuitors can be used and balanced outside the financial area: the sensors to keep a steady hand on current work, pushing toward the near-term deadlines (Ben Hur's inside horses); and, intuitors to identify new customers, new applications, and new technologies for the system.

### **Thinking and Feeling**

Types of judgment/decision-making are seen in individual concerns about your presence—what it bodes for the PM office. If you hear about possible hurt feelings and advice about how best to approach certain individuals, a "feeling" type is talking. It is wonderful to have a "feeling type" who's dealt with and can "read" congressional staffers, members of the CAIG and DAB, etc., to strategize future face-to-faces; and to tailor your internal approach to implementing changes.

The "thinker," the individual who builds an iron-bar link between cause

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***Sensors and intuitors  
can be used and  
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to identify new  
customers, new  
applications, and new  
technologies for the  
system.***

.....



and effect, can best serve as the strategist of the substance of the future, given decisions made today. This one can be on source-selection boards, sit on contractor reviews, advise on technology trade-offs and work hand-in-hand with the "feeling" type to build a solid POM defense.

Finally, where someone rates on the judgment/perception scale may help you decide who sits on the Configuration Control Board and is part of your strategic planning team ("judgmental type"). This person manages the stream of questions your program gets from The Hill; or, the shifting face of the POM and budget as they proceed through the Service, DOD and legislative systems ("perceiver"). You'll know them from the way the "judger" talks about how difficult it is for the program to be "unsettled," and wishes decisions would be made and "stuck to"; and, the way the perceiver talks about just wanting to know what's going on.

### **Accepting Possibilities for Change**

Your initial thoughts about teaming strategy are complicated because each person has combinations of the four trait pairs. All information you need for a clear picture of problems and personalities won't come from a single encounter and listening to the sources of resistance to change. More will appear when your team progresses beyond resistance to your presence and what it bodes, to the "exploration" stage of change—when the PM staff accepts and addresses the possibilities from change.

The kinds of ideas from people probably will reinforce or clarify any Myers-Briggs type uncertainty remaining; e.g., suggestion about changing the format of a report will be from an "S" type, as certainly as the suggestion that you drop everything and build a strategic plan comes from an "N."

### **Channeling the Talent**

As a new program manager, you have met the team and had little time to identify the most critical problems. Now, your role in the exploration process is to channel and focus the team's energy, so that it does not fly off track. Some processes may be one-on-one, but meetings may aid in team build-

ing. Consider the what, who and how in structuring group attacks on problems. What kind of problem? Who should participate in the problem solving process? What should that process be?

Technical problems are easiest to start to attack. You get a small group of technical/functional experts to analyze, identify alternatives, assess alternatives, and recommend solutions. If the people involved in the technical analysis are familiar with the system and have tentative conclusions, it might be best to introduce (with a facilitator) the Kepner-Tregoe structured method of problem analysis<sup>5</sup> to control the tendency to leap intuitively to a logical, but not necessarily correct, cause-and-effect pair.

Either within the group or in a review/advisory capacity, once you consider solutions you'll ensure there is a "sensor" to speak to the technical essence and an "intuitor" to see broader program implications of alternatives. Also, there will be a "thinker" to deal with the facts, and a "feeling" type to be sensitive to implications of alternatives on stake-holders.

### **A Level Playing Field**

You will know your type and how its predispositions may cause you to view ultimate recommendations. Without the range of perspectives on the problem, you may commit to the optimum immediate technical solution in lieu of a lesser solution which is technically and economically preferable in the long run, and more politically palatable/sellable.

Some organizational problems dealing with internal organization, work flow, and morale may benefit from a "level playing field" across the organization. If the organization is served by a local area network and there is an internal problem requiring buy-in from the bottom to the top, an automated brainstorming session may be a good way to get the most and best

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## **Gaining and maintaining team commitment to the program requires awareness and time.**

.....



ideas on the table, especially if participation can be anonymous. Identify a referee/manager of the interchange, set a time-limit for the process (at least a few weeks so that interchanges can fit and around other work).

Having deftly helped your team through the changing of program managers (or establishment of a new program with you as manager), don't stop short of the final step—fostering commitment. Gaining and maintaining team commitment to the program requires awareness and time. People feeling appreciated also feel they belong to the team. The PM must be aware of accomplishments and contributions of the team and must recognize them informally and formally.

### **Continued Maintenance**

The program manager must work at organizational maintenance. Time must be spent continually recycling the organization through management-led reaction to the process of organizational change; that is, provide information, listen, channel energy, and acknowledge accomplishments. Each program is continually changing; the net effect to the program manager to recognize and meet it head-on is a team committed to the program, and well-suited to carry it out.

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### **Endnotes**

1. Videotape, *Managing People Through Change*, Cynthia D. Scott and Dennis T. Jaffee, produced by BARR Films, distributed by Video Learning Systems, Haverford, Pa.
2. This is brought out in "The People Rollout: Key to Change" by Sally Cusack, *Datamation*, April 1, 1993, pp. 55-56.
3. *Introduction to Type: A Description of the Theory and Applications of the Myers-Briggs Type Indicator*, Isabel Briggs Myers, Consulting Psychologists Press, Inc., Palo Alto, Calif.
4. Remember the scene in Cecil B. DeMille's movie *Ben Hur* where Ben Hur meets a sheik at an oasis? Watching the sheik's white Arabian chariot team race around a track. Ben Hur predicts "they'll never hold the turn" well before they run off track. He explains to the sheik that the team was improperly organized: The horse with the steadiness who should be the anchor was on the outside, the horse with the spirit and speed was on the inside, etc.
5. *Kepner-Tregoe Problem Analysis* (Copyright Kepner-Tregoe, Inc., 1981, Princeton) is a highly structured form of analysis that "slows down" the analytical process and adds breadth to cause and remediation analysis.

# RESTRUCTURING THE ACQUISITION ORGANIZATION

## *The German Ministry of Defense*

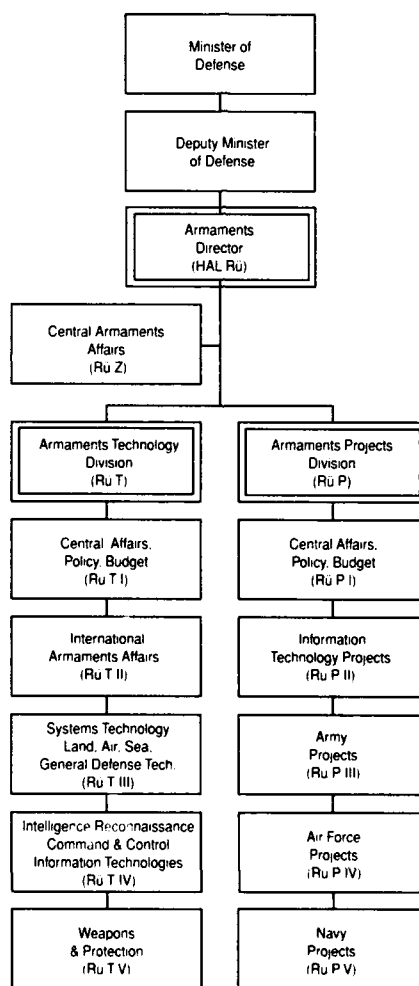
*Hermann O. Pfrengle*

**A** basic principle of efficient management holds that organizational structures should be oriented along the mission and tasks to be carried out by an organization. As mission and tasks change, so should the organization's structure.

Fundamental changes in threat perception accompanied by shrinking defense budgets, costly German and European unification, and new defense roles within NATO and the West European Union (WEU) are among major factors contributing to new political, economic and military realities in Europe, and beyond.

Germany's defense mission spectrum and associated tasks are undergoing shifts and changes to accommodate those new realities. The new military reality stresses streamlined rapid-reaction forces, multinational European rapid-deployment groups, lighter, air-mobile weapons systems and equipment. Consequently, the Armaments Directorate, which is the acquisition side of the German Ministry of Defense (MOD), has seen since 1990 major adaptive organizational changes

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**FIGURE 1. The MOD Armaments Directorate as Restructured in 1990 (German Short Designations in Parentheses)**

which I will discuss in this manuscript.

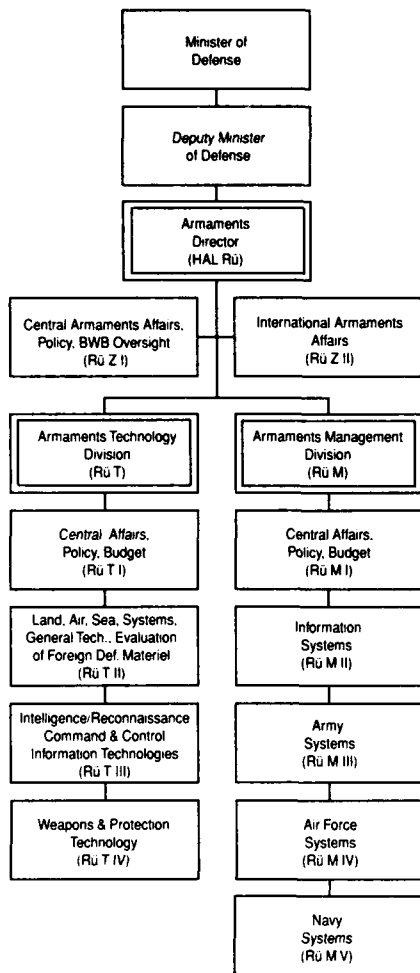
### **The MOD Armaments Directorate**

Following a major change in the German materiel acquisition process; i.e., the integration of the Concept Phase in the Preliminary Phase, the organization of the Armaments Directorate had been restructured in 1990, as shown in Figure 1. This first stage in a sweeping restructuring effort created two distinct pillars of armaments acquisition activities: Armaments Technology and Armaments Projects.

Previously, the two areas had been combined, but the new realities mentioned above, specifically economic and budgetary constraints, necessitated greater transparency and control above all as concerns costs.

This restructuring at the ministerial level<sup>1</sup> caused certain MOD-managed projects to be shifted to the implementing level; i.e., to the Federal Office for Defense Technology and Procurement (BWB) on the technical-engineering side, and the respective Army, Air Force and Navy Services General Offices.<sup>2</sup>

Due to mounting budgetary constraints which also necessitated per-



**FIGURE 2. The MOD Armaments Directorate as Restructured in 1992 (German Short Designations in Parentheses)**

sonnel reductions in the MOD and throughout the German defense community, the need for greater acquisition control at the ministerial level led in 1992 to a combination of the Service Component Staff's R,D,T and F Divisions (*Stabsabteilungen VII*)<sup>3</sup> with the Armaments Directorate's Projects Division. The end result is the Armaments Management Division as shown in Figure 2.

The Armaments Management Division's staff consists of military and civilian personnel in a balanced mix of leadership, management and central functions. This is a significant departure from the previous principle of civilian control over defense acqui-

sition; civilian control had been a tradition which had grown out of post-World War II concerns over too much military control of weapons acquisition.

### Organizational Details

The Armaments Director now has two Subdivisions directly assigned to him; i.e., Rue Z I and Rue Z II (see Figure 2). Rue Z I deals with central armaments affairs, policy, organization, planning, matters of economics and business administration. Last, but not least, it has oversight of the Federal Office for Defense Technology and Procurement (BWB) on the implementing level.<sup>4</sup>

Of particular importance from a multinational viewpoint is the organizational change in the MOD's business of international armaments co-

operation competition in most major systems areas, Germany relies on international cooperation for such major systems, and will more so in the future.

Subdivision Rue Z II's tasks comprise armaments matters and cooperation within NATO, WEU, IEPG,<sup>5</sup> country-specific cooperation, arms exports matters, and disposition of the former East German Armed Forces' materiel. The Armaments Directorate's concentration of its "foreign affairs" in Subdivision Rue Z II should also facilitate Allied contacts in such matters.

The Armaments Technology Division, with 4 Subdivisions and 25 Sections, bears the ministerial responsibility for steering and controlling all defense research and technology activities. Within the scope of the for-



**Because of the smallness of its defense industrial base, which cannot sustain acquisition competition in most major systems areas, Germany relies on international cooperation for such major systems, and will more so in the future.**

operation. Drawing from past experience, international armaments cooperation, which had previously resided at a lower level in the hierarchy, has now been elevated. It is directly assigned to the Armaments Director, providing him also with ready support in his function as the "German National Armaments Director" within the scope of NATO's CNAD forum.

This organizational evaluation signifies the heightened importance Germany attaches to acquisition through international cooperation. Because of the smallness of its defense industrial base, which cannot sustain acqui-

mal materiel acquisition process (see Figure 3), this responsibility covers the Pre-Phase, and the approval of the first Milestone document, the "Tactical-Operational & Technical Requirements."

The organizational structure of the Armaments Technology Division takes into account the overarching guidelines and armaments tasks embedded in the "Research & Technology Concept,"<sup>6</sup> and is oriented along the lines of technology activities extending across all three Service components. It consists of the following four subdivisions:



**The activities of Armaments Management are guided by the "single-management" principle; i.e., the organization is fully responsible for systems program management by work/effort, time/schedule, and funds/costs.**

In concluding this necessarily brief discussion of the German MOD's restructured armaments organization, it should be noted that some of these streamlining efforts are accompanied, of course, by pros and cons.

The pros stress the leaner organization's mission orientation, greater program management control at the MOD level, and more flexibility in adapting to the challenges of new tasks. The cons, largely from a military point of view, see a marked reduction of overall military influence in German systems acquisition.

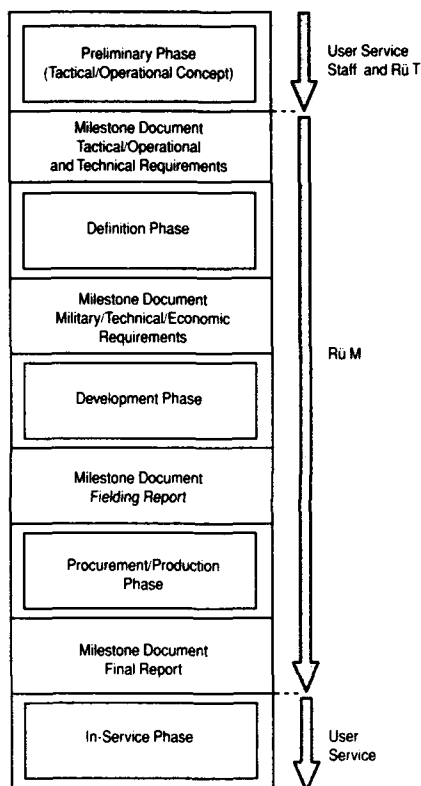
### Procedural Changes

A number of procedural changes in the acquisition process are associated with the Armaments Directorate's restructuring discussed above. I will address here only the most significant procedural change that may be of interest to the student of multinational program management.

From now on, only three figures will be in charge of ministerial systems management:

- The system manager, located in the Armaments Management Division
- The project manager, located in the BWB
- The system office located in the respective Service component's general office.

The system manager is the central figure in this national management triad. He has the overall responsibility for the system's development and procurement, in accordance with the Milestone objectives document, and higher-level decisions. His core tasks include planning, steering and controlling the acquisition process of his weapon system. To that extent, he is authorized to direct the BWB project manager, and the Service component system officer.



**FIGURE 3. Phase Responsibilities (Shown Along Arrows) in the German Materiel Acquisition Process (as of 1992)**

- T I, Central Affairs, Policy, Planning
- T II, Land, Air, Sea Systems Technologies, Platform-specific Technology; Evaluation of Foreign Defense Materiel
- T III, Intelligence/Reconnaissance, Command & Control Information Technologies

—T IV, Weapons Employment, Effects; Protection Technologies.

The Armaments Management Division consists of 5 subdivisions and 31 sections, and is responsible for steering and controlling the development of weapons systems. Within the scope of the formal materiel acquisition process, this responsibility covers weapons systems which are in the definition, development or procurement phases (see Figure 3) up to, and including, the "Final Report,"<sup>7</sup> the last Milestone document (at the transition from the Procurement Phase to the In-Service Phase).

The activities of Armaments Management are guided by the "single-management" principle; i.e., the organization is fully responsible for systems program management by work/effort, time/schedule, and funds/costs. The Armaments Management Division consists of the following five subdivisions:

- M I, Central Affairs, Policy, Budget
- M II, Information Systems (divided into functional aspects)
- M III, Army Systems
- M IV, Air Force Systems
- M V, Navy Systems.

The organization of Subdivisions M III to M V is structured along the lines of Service materiel responsibility.



As compared to the previous system management procedure, where the system manager was only a first among equals, and could make acquisition-related decisions only with the consent of the project manager and the system officer, the system manager now can yield more power.

As concerns the acquisition-related MOD management directives and guidelines, the required updating and adapting has been almost completed. The associated implementing regulations and instructions are scheduled to be available in 1993.

## Conclusions

The German materiel acquisition process—which had originally borrowed essential features from the U.S. systems acquisition process conceived in the 1960s under then Defense Secretary Robert McNamara—had remained virtually unchanged during two decades. In line with this continuity, the organization of the MOD Armaments Directorate had retained most of its original structure.

In the face of today's new political, economic and military realities, however, the changes described in this manuscript are important, and correspond with the management principle which says that the purpose of organizational structures is to support organizational processes. These processes are determined by an

organization's mission spectrum and tasks; i.e., in the case of the MOD Armaments Directorate, the more efficient acquisition of defense materiel.

The new organizational structure discussed here obviously emphasizes the German systems acquisition's technical and economic elements more than the purely military ones. Nevertheless, the new organizational structure of the German Armaments Directorate gives the military user more of a say in the technical-engineering and economic context than had been the case before.

As a guest lecturer in the DSMC Multinational Program Management Course, permit me a final word on international cooperation. The new political, economic and military realities appear to intensify intra-regional cooperation in Europe. Nevertheless, a closer look shows that cutting major weapon systems is currently more the rule than the exception.

One lesson to be drawn from this observation is that the acquisition of major systems in Europe is not necessarily less costly than trans-Atlantic cooperative acquisition. A lot depends, of course, on the specific kind of technology involved. Still, a recent U.S. study comes to this conclusion: "Germany's procurement process is relatively 'transparent' to allied suppliers, including those from the United States....On balance, we find that U.S.

industry has had equitable access to the German defense procurement market."<sup>8</sup>

By assigning international cooperation directly to the Armaments director, Germany also is signaling the heightened importance it attaches to acquisition among allies. If, in this vein, the United States would see fit to lessen some of its restrictions in technology sharing, a selective revival of trans-Atlantic armaments cooperation would be quite conceivable in the mid-term.

Experience shows, after all, that political will can be a powerful motivator, but sometimes needs a boost from economic necessity.

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## Endnotes

1. Comparatively speaking, the ministerial level would include most of the U.S. DOD, plus Component Staff acquisition functions; German Component Staffs are integrated in the MOD.
2. Changes on the implementing level will be discussed in a future article.
3. Roughly equivalent to the U.S. Service Components' Deputy Chief of Staff Offices for RDT&E, plus some Materiel Command functions.
4. See Endnote 2.
5. IEPG = Independent European Program Group, a forum to intensify cooperation among European countries.
6. This "Research & Technology Concept" is tied in with other German governmental technology perspectives beyond the defense sector.
7. Partly equivalent to the U.S. SAR.
8. C. M. Aquino, "Germany's Defense Market," Logistics Management Institute, Bethesda, Md., August 1992, p. xii.



**In the face of today's new political, economic and military realities, however, the changes described in this manuscript are important, and correspond with the management principle which says that the purpose of organizational structures is to support organizational processes.**

# DOD CONTRACT PERFORMANCE MANAGEMENT AND TQM

## Three Principles

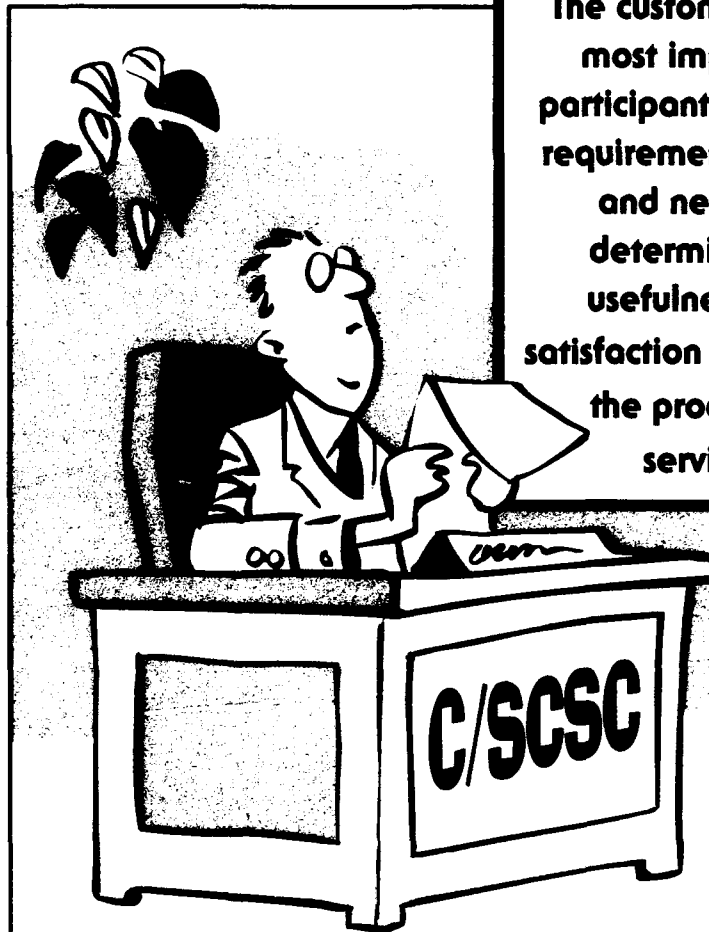
Mr. Joseph R. Houser  
Dr. Kenneth A. Potocki

**A**n approach is presented for the continued application of total quality management (TQM) principles to the Department of Defense (DOD) contract performance management process. The cost and schedule management subprocess of DOD contract performance management is addressed with respect to the TQM principles—customer focus, employee involvement and continuous process improvement.

The DOD management and contractors have achieved success using TQM to improve cost and schedule management. This paper will advocate continued use of TQM and will present concepts on how TQM can further improve DOD cost and schedule management.

### Introduction and Background

The DOD contract cost and schedule management process is defined by DoD Instruction 5000.2 Cost/Schedule Control Systems Criteria (C/SCSC). This DOD Instruction defines the data



The customer is the most important participant to define requirements, wants and needs to determine the usefulness and satisfaction levels with the product or service.

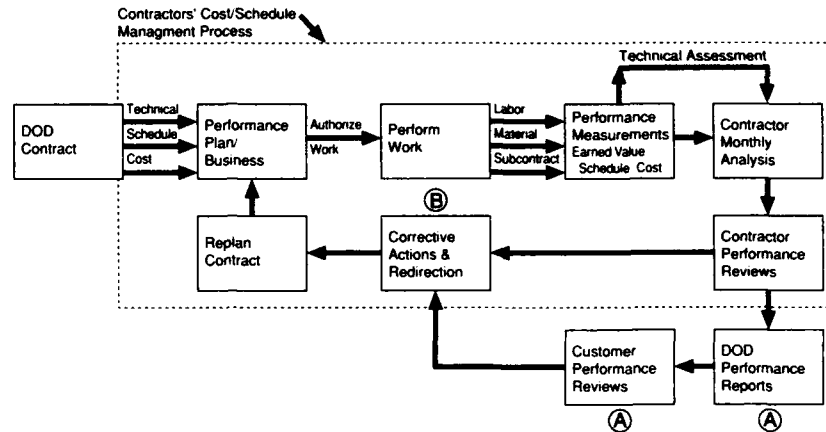
*Mr. Houser is a consultant with IBM Federal Systems Company. He was the industry leader for the DOD/NSIA TQM study on cost/schedule management. He is Chairman of the Board and past President of Performance Management Association (PMA), and is past Chairman of NSIA's Management Systems Subcommittee.*

*Dr. Potocki is Associate Department Head of the Technical Services Department at The Johns Hopkins University Applied Physics Laboratory. He has been a program manager for DOD and NASA programs at the Applied Physics Laboratory, and he teaches TQM at the G.W.C. Whiting School of Engineering.*

requirements for the contractors' cost/schedule management process. It is structured to permit contractors to use existing systems to the maximum extent possible with the intent of using the same data for DOD reporting that the contractor uses for managing cost and schedule performance.

Figure 1 illustrates the DOD cost/schedule management process. The contractors' cost/schedule management process is depicted within the dashed-line box. The data from this process is used for DOD performance reports generated by the contractor and used by DOD to conduct performance reviews on the contract as de-

**Figure 1. DOD C/SCSC Cost/Schedule Management Process**



paper demonstrates how TQM can continue to improve the effectiveness and efficiency of the C/SCSC process.

### Customer Focus

The quality of a process can be determined by the results it achieves and customer satisfaction. A process has external customers who purchase products and services and internal customers who require output from an entity within the process. For example, within a contractor's cost/schedule management process, a cost estimator requires a contract schedule from the scheduling department in order to develop an estimated cost for the contract. The cost estimator is an internal customer of the scheduling department.

J. M. Juran provides a customer-focused definition of quality as fitness for use. Customers have needs, and they determine the usefulness and satisfaction level derived from services and products. A key ingredient to the successful application of TQM is a customer focus by process owners who are constantly striving to maximize customer satisfaction levels.

Figure 2 illustrates customer involvement defining requirements at the front end of the process and the customer feedback on satisfaction levels with the service or product at the end of the process. The customer is



icted by the blocks referenced with an Ⓐ.

Corrective actions and redirection result from both the contractors' and DOD's performance reviews as depicted in the block referenced with a

Ⓑ. Contract performance reviews by DOD and contractors use the same cost and schedule performance data.

Using the same process to satisfy two different customer groups, DOD and industry, is a complex task. This

**Table 1. DOD Cost/Schedule Customers**

<b>DOD Customers</b>	<b>Contractor Customers</b>
OUSD(A) Executives	Contractor Program Managers
DOD Program Managers	Executives
Systems Acquisition Executives	Accountants
Program Executive Officers	Financial Managers
Program Budget Analysts	Estimators/Pricers
Cost Estimators	Engineers
Defense Contract Auditors	Production Managers
Program Office Analyst	

the most important participant to define requirements, wants and needs to determine the usefulness and satisfaction levels with the product or service.

### **DOD Cost/Schedule Management<sup>1</sup>**

The DOD contract cost/schedule control process is a shared management approach by DOD and defense contractors to manage major systems programs as illustrated in Figure 1. The DOD and contractors have a shared ownership of the cost/schedule management process and a joint responsibility to ensure the process meets the needs of both DOD and the contractor, including external and internal customers.

This shared responsibility and process ownership is a major challenge to the successful application of a customer focus to TQM. A large team effort involving all the participants in this shared process is required to improve the process. Some of the many customers of this process for government and contractors are illustrated in Table 1.

Management functions from DOD and industry have different goals and objectives, but they each desire to embrace TQM. The A. D. Little survey on C/SCSC<sup>2</sup> found different customer needs. The survey stated the

following: "Because the various users of C/SCSC (Cost/Schedule Control Systems Criteria) have somewhat different needs and perceptions, some of the controversies surrounding C/SCSC may not be as amenable to resolution as others."

The DOD/NSIA (National Security Industrial Association) TQM study on Cost and Schedule Management<sup>3</sup> consisted of 250 interviews with the customer groups as identified in Table 1. Both of the referenced studies identified a broad and diverse population of customers with varied needs and requirements with relatively equal ranking in importance.

The DOD/NSIA study found a higher satisfaction level with the cost of C/S (cost and schedule) management. Contractors expressed a lower satisfaction level related to duplication of some elements of C/S management. This process with shared responsibilities and conflicting needs between customers requires a well-coordinated effort to achieve customer satisfaction for all users in the DOD cost/schedule management process.

### **Observations**

It is common TQM practice to evaluate customer needs and importance. Many past efforts have focused on internal customers. More recently, efforts to implement TQM concepts

in the DOD cost/schedule process have rightfully identified program management as a key external customer whose needs have not been adequately satisfied by this process.

Many of the recommendations from the TQM report of DOD Cost/Schedule Management recognized the importance of program management as an external customer. Program management is responsible for program success and is accountable for managing programs on schedule and within cost targets. This report suggests that DOD and contractor TQM initiatives in cost/schedule management should emphasize an increased customer focus on program management.

Program management should have a strong voice in defining requirements, and their satisfaction should be a driving force behind most improvement activities. While it is appropriate to increase efforts to improve the satisfaction levels of program management, it should not de-emphasize the importance of the internal customers. The challenge of a customer-focused TQM program is to continually strive to improve the satisfaction level for external and internal customers.

Tom Peters, in his book *Thriving on Chaos*,<sup>4</sup> stresses the importance of a strong customer focus to improve organizational performance. Peters recommends a Customer Information System (CIS) consisting of formal market research and surveys to quantify customer needs and satisfaction.

It also includes informal customer telephone calls, customer meetings and correspondence. Both DOD and industry leaders in cost/schedule management (and C/SCSC) can take demonstrable actions to listen to all customers, measure customer satisfaction and team together to use this information to improve the process.

Program management is a key external customer whose satisfaction level

with DOD cost/schedule management has been low; it is appropriate to focus process improvement efforts to improve their satisfaction level.

### Employee Involvement

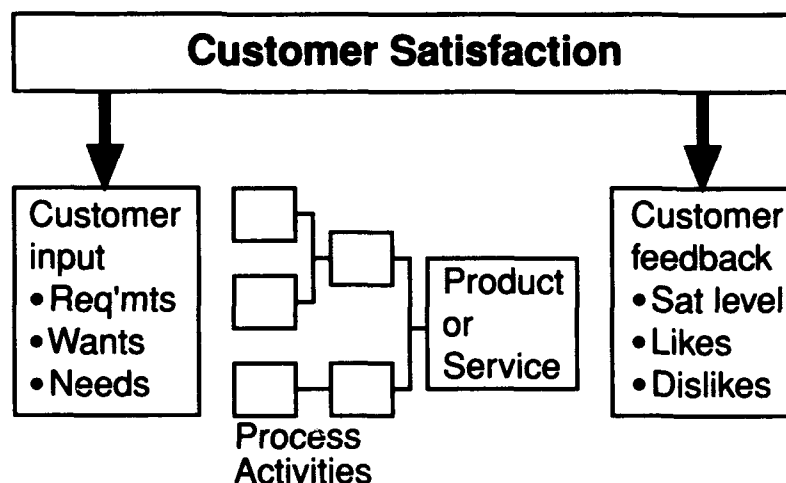
Improving and increasing the value of products and services is a common objective found in the various approaches to TQM. While TQM leaders have somewhat different approaches, they have common ingredients. Quality leaders such as W. Edwards Deming, Joseph M. Juran, Kaoru Ishikawa and Philip B. Crosby stress the importance of work-force employee involvement to improve the value of products and services. Their views are summarized as follows:<sup>5</sup>

- Deming* - Quality is everybody's job
  - Organization-wide participation
- Juran* - Problems and opportunities need to be identified and solved through task teams
  - Company-wide participation
- Ishikawa* - An atmosphere of mutual trust and respect is necessary for full employee involvement
  - Quality control should be a company-wide effort
- Crosby* - Encourage employees to communicate obstacles to management
  - To ensure success, develop team leadership skills and encourage interdepartmental collaboration
  - Form quality improvement teams.

### DOD Cost/Schedule Management

Leaders in DOD contract cost/schedule management have recognized the need to address work-force employee involvement. The A. D. Little survey on C/SCSC stated: "We concluded that recommending the insurance of directives or even more guidance would probably not help the (C/SCSC) situation....Instead of more

**FIGURE 2. Customer Process Participation**



guidance, we concluded that we would recommend attacking the problem(s) at its source. The sources are (a) the inadequate understanding of many industry and government personnel on what C/SCSC can be expected to accomplish and (b) the inadequately qualified C/SCSC DOD practitioners."

The A. D. Little study recommended work-force employee involvement actions involving persons within DOD and industry who implement and operate DOD cost/schedule management systems.

The DOD/NSIA TQM report on DOD Cost/Schedule Management Process made 18 recommendations. The DOD and NSIA formed integrated work groups from DOD and industry with representation from all involved disciplines and functions to identify and

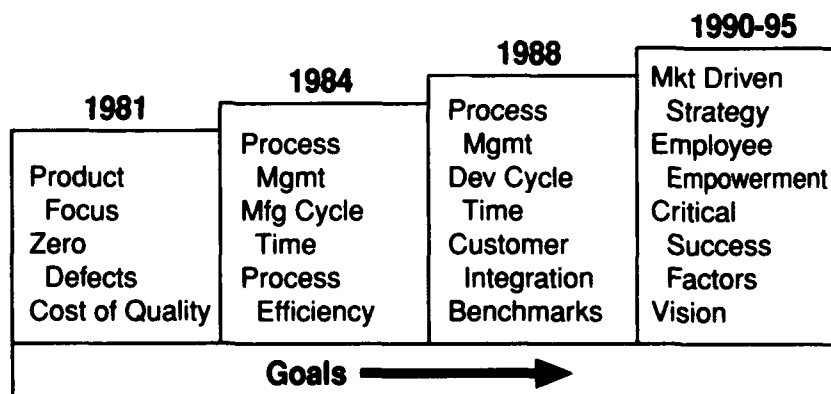
solve problems. These work-force employee groups have taken corrective action on 17 of 18 recommendations.

The DOD has taken additional actions to encourage work-force employee involvement, such as issuing guidance to encourage industry use of nonfunctional work teams from DOD and industry to manage contracts. The DOD executives have lectured at conferences and visited contractors to communicate their views supporting work-force employee involvement concepts.

### Observations

Significant developments from the TQM approach are new management and organizational theories related to work-force employee involvement. These include employee empower-

**FIGURE 3. IBM Rochester Quality Journey**



ment, removing functional barriers, and multifunctional work groups. These work groups are commonly called work teams and DOD often refers to them as Integrated Product Teams (IPTs).

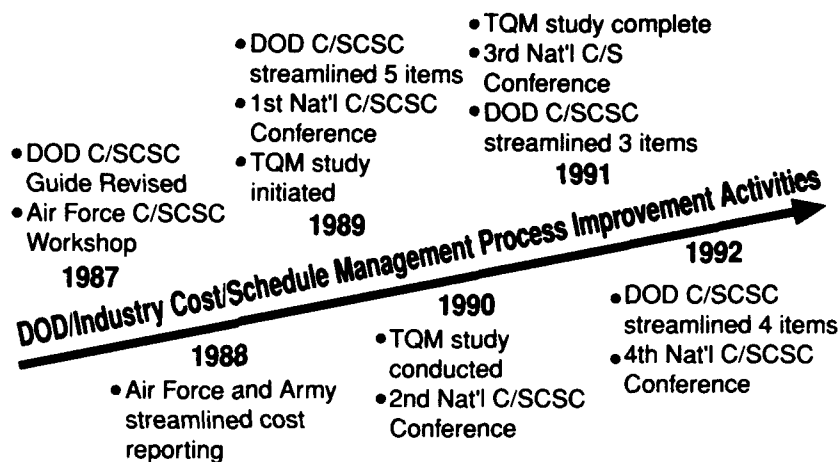
Contractors and DOD are supporting multifunctional work groups in an effort to improve organizational cooperation and increase effectiveness and efficiency. Dennis C. Kinlaw, author of *Developing Superior Work Teams*, emphasizes the importance of work-force employee involvement to achieve superior results from organizations. He states, "In the many years that I have consulted with organizations, I have heard all sorts of complaints from all kinds of jobholders. But there is one complaint I have never heard—people have never said to me that there was too much teamwork in their organization."

The DOD organizations, government and industry, are restructuring in response to the significant reduction in DOD budgets. As part of this restructuring, many organizations are moving toward employee empowerment and removing functional barriers.

These organizations are reducing middle management, headquarters operations and support staffs; forming integrated product teams; implementing concurrent engineering and self-directed work teams; and revising compensation plans to reward team performance.

The DOD and industry leaders in cost/schedule management can review what they are doing to proactively promote employee empowerment and break down functional barriers. Contracts and organizations can be encouraged to use multifunctional work groups to solve problems in their cost/schedule process. Contracts and organizations successfully empowering employees and removing functional barriers can be recognized and advertised.

**FIGURE 4. DOD/Industry TQM Activities**



Those involved with DOD cost/schedule management, government and industry, can take the initiative to become leaders in work-force employee involvement by looking for opportunities to promote multifunctional work groups to improve the efficiency and effectiveness of the C/S process.

### Continuous Process Improvement

Developing world-class processes and obtaining results from applying TQM requires time. The quality journey for the IBM Rochester Plant (winner of the 1990 Malcolm Baldrige National Quality Award) with approximately 10,000 employees, spans several years with carefully developed initiatives as illustrated in Figure 3.

In continuous improvement, each organization or process is unique, and each quality journey will have to be customized to its unique environment. As illustrated in Figure 3 the quality journey is a series of phases with each phase expanding and stretching the organization's goals to achieve world-class results.

### DOD Cost/Schedule Management

The quality journey for DOD contract cost/schedule management covers many years. In 1967, DOD im-

proved the process by changing from a regulatory specification approach to a process based on criteria which permitted contractors to maximize their use of existing internal control system. During the mid-'70s there were many task forces established to improve DOD contract cost/schedule management.

During the mid-'80s, DOD and industry, through NSIA, initiated a TQM partnership to improve the DOD cost/schedule management process for contractors and DOD, as illustrated in Figure 4.

There have been several carefully planned activities and initiatives which have resulted in process improvements. The quality journey continues and, as of this writing, DOD is updating its training and educational material to reflect the changes from this TQM activity. In addition, the DOD Joint Implementation Guide (JIG) for DOD cost/schedule (C/SCSC) is being updated to reflect the same changes.

### Observations

Achieving and maintaining a "world-class process" and obtaining a high level of customer satisfaction is a continual effort. The principle of continuous improvement complements and animates the principles of customer focus and employee involvement.

Customer focus identifies the issues, employee involvement produces solutions and implements changes, and the improved process provides the benefit to DOD and industry. It gets the job done well at a more competitive cost. Most DOD and defense-related industry organizations are going through significant change with the reduction of DOD budgets.

These organizations are downsizing and/or consolidating, and many are expected to "do more with less." In this changing environment, DOD and contractors will have to improve their organizations and processes to maintain and improve existing performance levels.

With these changes, DOD and contractor organizations are seeking improved cost/schedule management practices to improve organizational and contractual performance measurements.

The DOD contract cost/schedule management and the TQM partnership between DOD and industry has achieved admirable results, but a world-class process requires continuous improvement with expanded performance goals.

## Summary

Achieving sustainable DOD cost/schedule management process improvements has been a priority for DOD and industry for a significant

period of time. The importance of achieving sustainable improvements is greater in the current environment of downsizing and consolidation for both DOD and contractors.

According to a U. S. Government Accounting Office (GAO)<sup>7</sup> study, 20 firms with TQM programs that scored high on the Malcolm Baldrige National Quality Award have high organizational performance. As illustrated in Figure 5, the GAO study found the majority of the measurable performance results in the four areas studied to be positive.

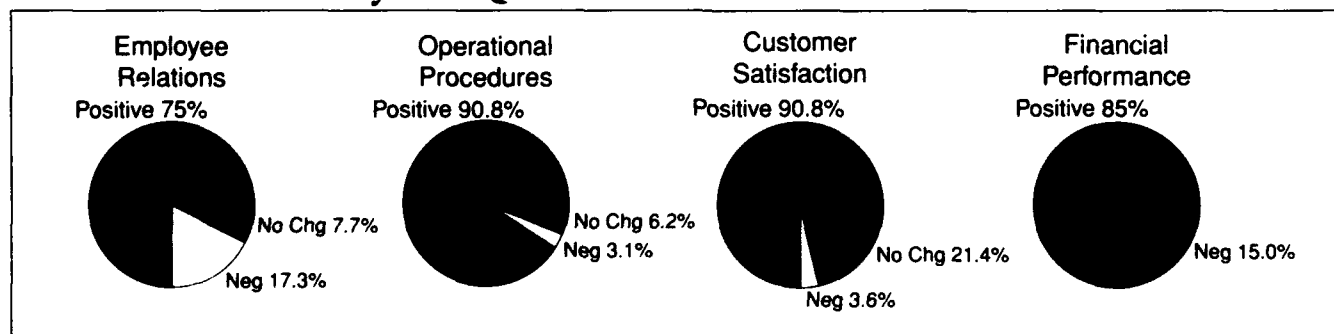
The DOD cost/schedule management process has benefited from past TQM activities. The DOD stated that as a result of TQM and other improvement activities<sup>8</sup> "Contract estimates at completion (EACs) reported to us by our program managers in quarterly management summary reports, are now significantly more realistic than they used to be." The NSIA President said as a result of changes that DOD and industry have jointly implemented,<sup>9</sup> "Cross industry savings are difficult to quantify but initial projections could reach over a billion dollars per year."

This paper focused on the TQM principles; Customer Focus, Employee Involvement, and Continuous Improvement. Government leaders in DOD cost/schedule management have and can continue to achieve improved results by the continued application of TQM.

## Endnotes

1. DOD cost/schedule management is defined by DOD Instruction 5000.2, Cost/Schedule Control Systems Criteria (C/SCSC).
2. Survey Relating to the Implementation of Cost/Schedule Control Systems, A.D. Little, Program Systems Management Company, dated 12/5/83 and 8/15/84.
3. TQM Report for Program Management on the Cost/Schedule Management Process, DOD and NSIA (National Security Industrial Association) dated 5/17/91.
4. *Thriving on Chaos*, Tom Peters, Alfred A. Knoff, New York, 1987.
5. *Quality Tree*, The Maryland Center for Quality and Productivity College of Business and Management, University of Maryland.
6. *Developing Superior Work Teams, Building Quality and the Competitive Edge*, Dennis C. Kinlaw, Lexington Books.
7. How the Baldrige Award Really Works, David A. Garvin, *Harvard Business Review*, November-December 1991.
8. Office of the Under Secretary of Defense (Acquisition), Deputy Director for Performance Management, memorandum to NASA Administrator, dated March 12, 1993.
9. National Security Industrial Association memorandum to Office of the Under Secretary of Defense (Acquisition), dated July 1992.

**FIGURE 5. GAO Study on TQM**



# REENGINEERING BUSINESS ORGANIZATIONS

## *Impact On Information System Program Management*

James E. Price, Ph.D.  
Sharlett Gillard, Ed.D.  
Mary-Blair Valentine, DPA

**I**nformation systems development has evolved through various stages of organizational reengineering. Since specific hierarchial structures are tailored to accomplish unique business objectives, this incremental shift has resulted in myriad organizational structures. The unanswered question is: What is the optimum organizational structure for an information system program office?

This paper suggests that a paradigm shift has occurred. Program managers have moved from yesterday's matrix organizational structure to one more appropriately described as a tri-dimensional organization. The term tri-dimensional organization depicts the width, depth, and height of program manager responsibilities in the program office, within the parent or-

ganization, and at the point where they interact with external organizations.

Its use is intended to depict the width of the flat matrix organization, depth of the parent organization, and height of the multiorganizational hierarchy in which program managers function. The concept of the tri-dimensional organization was developed to shift the paradigm of matrix management from one focusing solely on internal workings of the program office to one addressing the impact of the external environment on the organization.

### **Organizational Environment**

In the early days of information system development, the technical community generally played the key leadership role. Since organizations typically followed functional or departmental lines of authority, a data processing (DP) or electronic DP department housed the "computer gurus," and were depicted on organizational charts as a staff line to the accounting department or a vice-president.

Though the title "program manager" emerged later, the DP or EDP

department manager functioned as an information system program manager (PM), charged with oversight and leadership of technically oriented personnel. Subordinates were assigned permanently to the department and answered only to one manager. Novice user groups provided little input (usually only user requirements) and learned to be satisfied with the system produced.

Such organizational structure gave rise to centralized authority for the DP department manager; i.e., program manager. In a centralized environment, the PM was charged with all communication between the information system developers and individuals outside the department—user-groups, peer managers, senior executives, and external entities like vendors, special-interest groups, the legal environment, etc. The knowledge, skills, proficiency, interpersonal abilities, and communication competence of the PM were paramount factors in the success or failure of the system.

The paradigm shift occurred when user groups became computer literate, resulting in a maturation in the art of information systems development. Matrix organizations is a term

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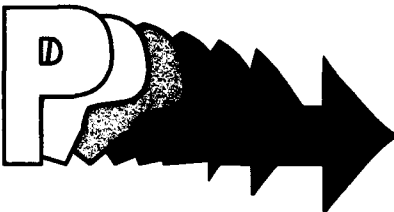
used to describe the multidimensional organization that resulted when program teams were superimposed on existing organizational structures. A graphic depiction of a matrix organizational structure is provided in Figure 1. Observe that program management operations are positioned along the vertical axis, and the functional, technical, and support departments along the horizontal axis.

In matrix organizational structures, department managers share control of their subordinates with the program manager. Program managers are responsible for schedules, budgets, assessing alternatives, and leading the program to successful completion. Managers of the functional, technical and support departments provide personnel and technical assistance to the program manager. Perhaps Sammet and Green sum it up best by stating that the PM "... is responsible for 'what' and 'when,' and the...department managers...are responsible for the 'how'."

#### Subordinate Status

In a matrix organization PMs oversee two types of subordinate groups.

**PARADIGM SHIFT**



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and Green sum it  
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that the PM "... is  
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'what' and 'when,'  
and  
the...department  
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responsible for the  
'how'."***

One group includes program team members permanently assigned to the program and solely under the PM's authority. The second group consists of matrix support personnel, or subject-matter experts from the organization's functional departments, who are temporarily attached to the program team but remain assigned to their parent department. They are responsible to both their department supervisor and the PM.

Gibby introduced the term "shared authority" to describe this unique, co-existent relationship that persists between PMs and managers of supporting departments.<sup>2</sup>

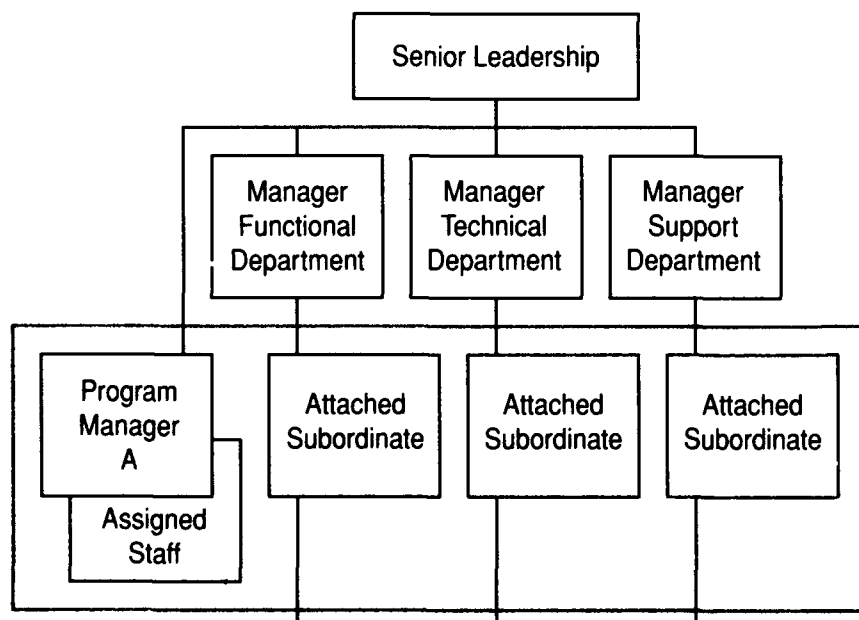
#### Measurement Criteria

In early matrix organizational environments, program managers were appointed to head the automation effort. Initially, these managers were technicians. The results they produced were inconsistent. Some systems were purported to "work well" while others were "unsuccessful." Both terms were quickly recognized as relative.

Over time a generally agreed upon measure became this: The design, development and fielding of an information system is deemed "successful" when the information system satisfies the user requirements, is produced within budget, and is completed on time. Although the order of priority is sometimes changed, these three criteria have become universally accepted by developers of information systems.<sup>3</sup>

The paradigm shift from technician-led systems development to matrix-oriented program teams solved many early problems associated with producing an information system that met user requirements. Matrix organizations tend to focus on the end product. This rather myopic view can produce a technically effective information system; however, technically effective information systems are not

**Figure 1: Matrix Organizational Structures**



automatically accepted by oversight agencies, corporate organizations, competitors, user-communities, and customers.

Hence, that initial paradigm shift did not solve problems associated with designing, developing, and fielding an effective information system.

### Tri-dimensional Structure

Program managers operate in a tri-dimensional organizational structure to promote sound management and efficient use of its resources. The program office consists of the program team; the inter-organization comprises the parent organization, user community, and contractor(s); and, the inter-organization is made up of external organizations having a vested interest, or oversight authority, in the program office. This tri-dimensional organization concept is depicted in Figure 2.

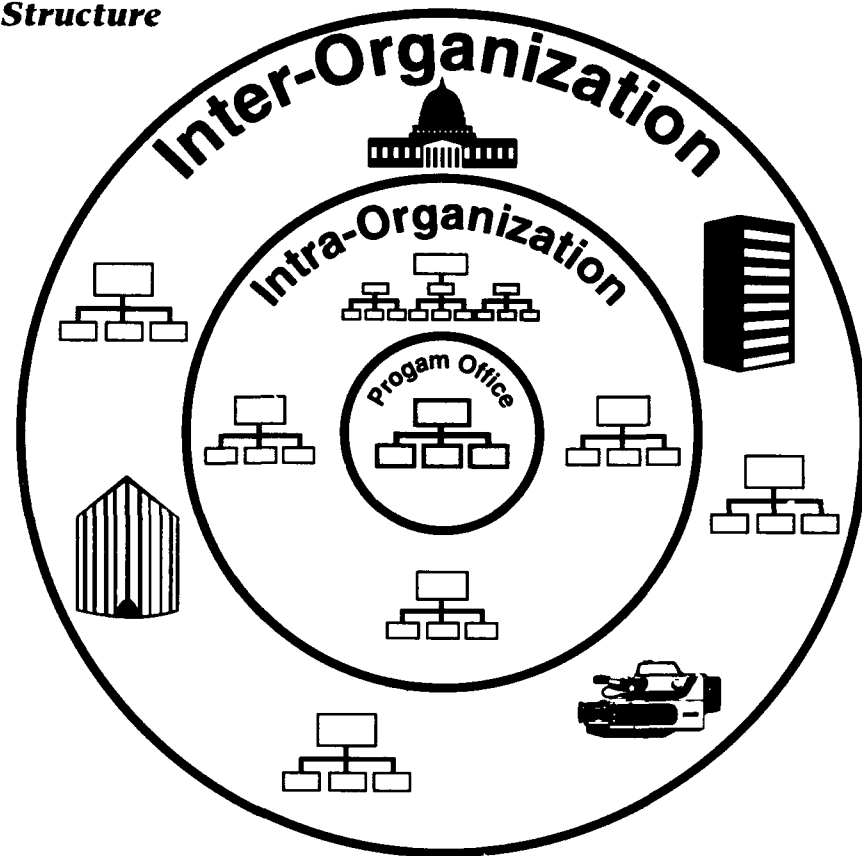
At each level, or ring, program managers and their teams have specific interests. At the first level, program office, the program manager is charged with day-to-day leadership. The PM interacts with system developers and personnel dispersed throughout the organization. Primary concerns are issues related to matrix organizational structures and lines of authority.

Hence, at the first level in the tri-dimensional organization structure, program managers are encumbered with an ambiguous leadership role. Their day-to-day focus is on team building; developing and maintaining relationships with functional, technical and support department managers; and the profusion of technical details associated with designing, developing and fielding an information system.

### Level Two

As program managers move into the intra-organizational ring, level two in the tri-dimensional organization structure, they begin to interact with

**FIGURE 2. Tri-dimensional Organizational Structure**



other departments in their organization, the user community, and supporting contractors. The PM focus shifts between managing contractor support, meeting customer requirements, and establishing how the program office "fits" with the rest of the organization.

In contrast to the first level where the program manager has some degree of autonomy, the second level exposes the PM to competition for finite resources within the parent organization. Concerns include survivability of the information systems program, professional credibility, and peer-group acceptance.

Generally, the immediate program team might be relatively small. However, at the second level when representatives from the user community are considered, the team grows considerably. Indeed, it is not unusual for the team to number in the hun-

dreds. The size of the team and the level of complexity involved is difficult to imagine.

For example, when contractors join the team to accomplish technical functions associated with designing and developing an information system, the numbers become astronomical. Consider this: One programmer can be expected to write, test, and debug 2,000 lines of computer code in one year.<sup>4</sup>

Thus, the number of programmers involved becomes mind-boggling, considering that many information systems contain several million lines of computer code. To further complicate the issue, the code is often produced by programmers working in geographically dispersed groups. One recent author [Marsh, p. 63] likened it to publishing a 37-chapter novel, with a different person writing each chapter, from a different country.

## Inter-Organization Level

Finally, program managers operating at the inter-organizational level, or third ring, highlight strategic issues. Examples include external oversight and how the program office operates in the inter-organizational environment. In addition, they identify stakeholders, secure sponsors, and build relationships with constituents. The focus is on how the organization (rather than the program office) "fits" into the global community.

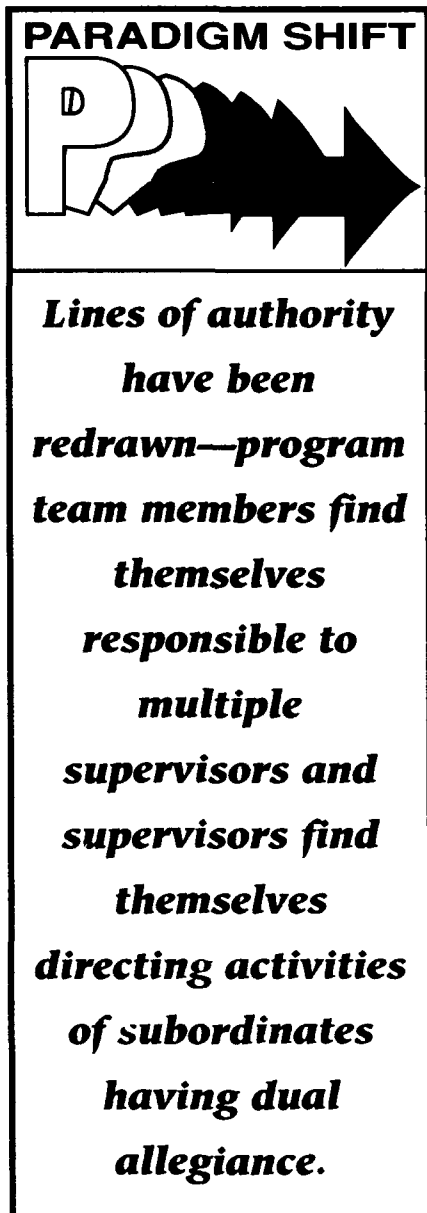
Robert Block [1983]<sup>5</sup> would likely refer to this level as the political component, or that group of people outside the information system-building community (levels one and two) who make problem-solving decisions that can make or break an information systems initiative. Indeed, Block concludes that the political component is the major contributor of program failure. Hence, successful program managers learn how to interact with the oversight community represented in Figure 2 as the inter-organizational level.

To accomplish this program managers identify stakeholders, identify and secure sponsors/advocates, and build relationships with constituents. Some authors characterize this level of program manager as "Mr. Outside," because they are concerned with fighting resource allocation battles in headquarters, preparing justifications for fiscal authorizations, testifying, and monitoring the execution of programs.

The difficulty is that program managers must be all things to all people at all times. Specifically, program managers and teams must effectively manage all three levels in the tri-dimensional organizational structure simultaneously. This is quite a task for one person.

## Summary

The paradigm shift from functional organization structures to matrix or-



ganizations has precipitated alterations in traditional management perceptions. As program team members are procured from functional areas, operations of those areas are exposed to greater scrutiny. Information integration from a variety of departments has generated a previously unrivaled degree of interdependency.

Power/authority relationships have shifted and, indeed, remain in flux as PM team members change from program to program. Lines of authority have been redrawn—program team members find themselves responsible to multiple supervisors and supervi-

sors find themselves directing activities of subordinates having dual allegiance.

Thus, numerous management variables are undergoing metamorphosis. As with previous paradigm shifts, the tri-dimensional structure offers solutions to existing problems and opportunity to meet new challenges.

## Endnotes

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3. Atkinson, Rick and Barton Gellman, "Navy Fires Three Working on Top Jet: Lagging Schedule, Cost of A-12 Cited," *The Washington Post*, December 5, 1990, pp. 1 and 19; Bobrowski, Paul M., "Project Management Control Problems: An Information Systems Focus," *Project Management Journal*, (1989), p. 11; Kerzner, Harold, "In Search of Excellence in Project Management," *Journal of Systems Management*; (February 1987), p. 31; Moir, James, "Project Methodology, Organization, and Structure," *Journal of Information Management*, p. 38; Pinto, Jeffrey K. and Dennis P. Slevin, "Critical Success Factors in Effective Project Implementation," ed. Cleland, David I. and King, William R., *Project Management Handbook*. (New York: Van Nostrand Reinhold, 2nd ed. 1988), pp. 481-2; Thayer, Richard H. Arthur B. Pyster, and Robert C. Wood, "Major Issues in Software Engineering Project Management," *IEEE Transactions on Software Engineering*, Vol. SE7 No. 4, (July 1981), p. 333.
4. Marsh, Alton. "Pentagon Up Against a Software Wall," *Government Executive*, Vol. 22, No. 6, (May 1990), p. 63.
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# FOREIGN MILITARY SALES COOPERATIVE DEVELOPMENT

## *A Better Solution*

*John L. Sweeney*

**A**s resources devoted to defense procurement contract and technology become more advanced (more expensive), affordability becomes more of a driving factor in our capability to maintain the best equipment in the hands of the operating forces. Moreover, the technology and manufacturing base of our allies often approaches, and occasionally surpasses, ours. With similar economic and defense requirements, they too are faced with the "guns or butter" trade-off. Far too often we individually attack the same problems and end up with similar, redundant solutions. By approaching them cooperatively, we could save money and, more importantly, likely achieve a better solution through the synergism of our combined technological talents.

The argument sounds reasonable and is the basis for Senator Sam Nunn's many cooperative development initiatives; and the proscription in 5000.2 to seek a cooperative development before a unique one. The cooperative approach is rarely pursued.



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From a program manager's standpoint, foreign involvement in his system places a significant burden on the management of the program, with little obvious direct return. All parties

are reluctant to share technologies. The contractors are reticent to become involved with competing contractors. The reduced cost associated with shared development and pro-

duction, to be sure, lessens the burden on the taxpayer but generally is not returned to the program. Thus, funds available to the program are reduced. Added complications of split constituencies, unique customer requirements and political overtones often dilute resources available to the program. Many programs have found that, despite these limitations, there are benefits to be had.

## Success

To illustrate this idea, I would like to recount the successes of the Navy's E-2C Hawkeye. In addition to

ter. The experience gained by living through operations in a unique environment and culture allowed us to understand the strengths and limitations of our system better, and to tailor our support systems better. But most of all, by applying ourselves together, cooperatively, we have continued the improvement of the Hawkeye.

The E-2C Hawkeye is the world's foremost Airborne Early Warning system. It is the central actor in virtually all the Navy's Carrier Battle Group operations providing not only early warning, but all command and con-

grated tactical picture which is then provided back to the battle group.

The system has grown during the years to keep abreast of the threat and the changing operational environment through a program of continuous product improvement. The E-2C has undergone five major system upgrades resulting in the present system, currently undergoing initial operational test and evaluation (IOT&E). Each iteration increased the Hawkeye's capability, diversity and utility.

In addition to the U.S. Navy, the Hawkeye is used by several of our allies; Israel, Japan, Egypt, Singapore and, soon to be, Taiwan. It sees worldwide service operating in a diversity of environments and cultures. Each of these brings their nuance; their unique circumstances. Notwithstanding, all users are part of the Hawkeye family with common needs and problems. The members of the family have been able to continue growth and solve problems which would have been more difficult, or impossible, to resolve on an individual basis.

## State of the Art

To illustrate this point, I would like to cite a few of our successes. When Egypt bought the Hawkeye, the USN Interrogation Friend or Foe (IFF) was basically the original system; 20 years old and technologically outgrown. Egypt needed a unique IFF that would function with both Egyptian and U.S. formats. Egypt funded the development of this system as part of its E-2C procurement. Here, Egypt's need and funds were applied with U.S. effort and the Hawkeye program gained. We built the system and the fallout technology allowed the USN to develop a state-of-the-art system for USN aircraft.

To regress a little, as mentioned, the Hawkeye is the product of an iterative development program. As the radar and the computer were im-

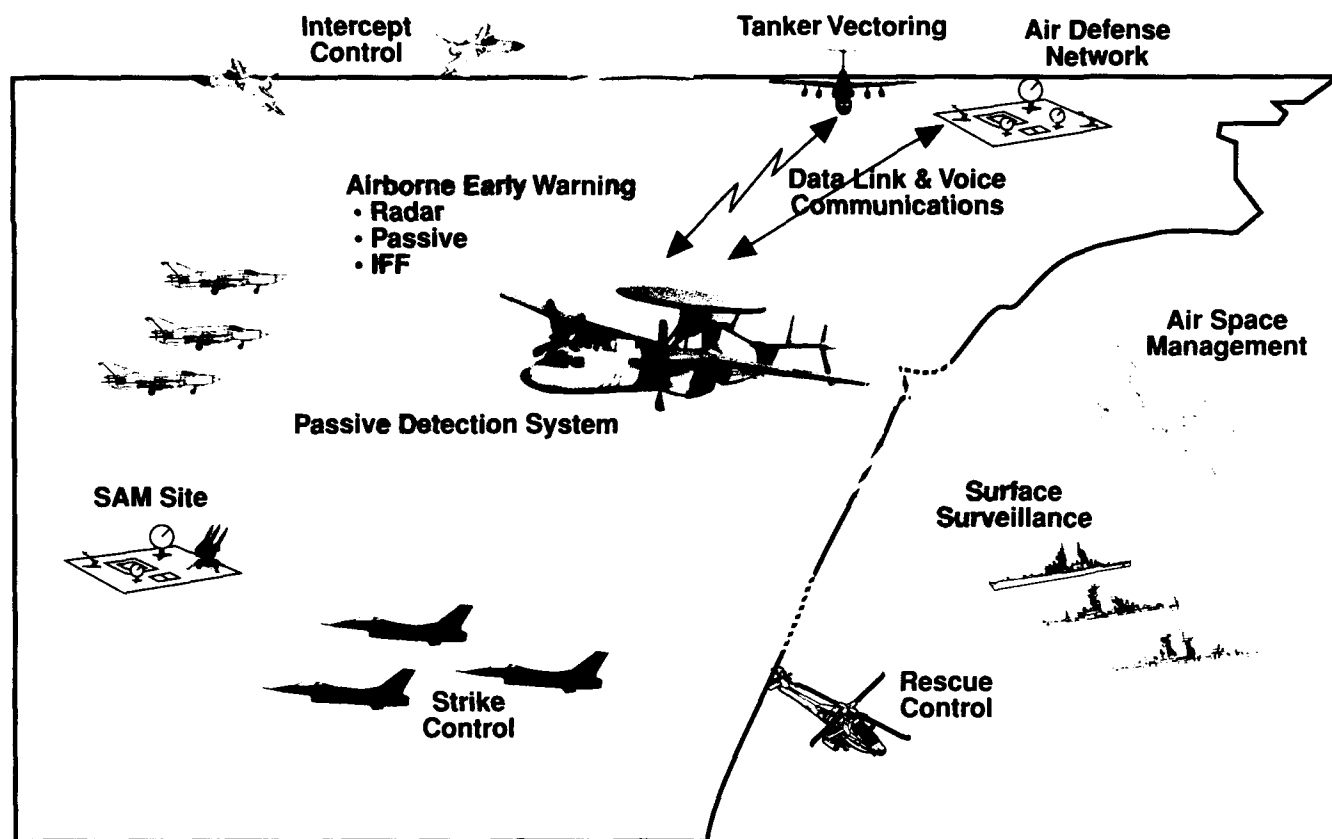


E-2C Hawkeye

supporting the "national good" by aiding our allies in their defense efforts, the perspectives gained by accommodating another view allowed us to structure our own program bet-

terol functions; from strike guidance and support, to search and rescue. The Hawkeye is the eyes of the Fleet. Its system combines multisensor detection information into a highly inte-

## E-2C Multimission Capability



proved, the display system became a choke point. Our fleet, supported by the test and evaluation community, cried the need for a better display; but the resources just weren't there. Egypt, too, wanted the maximum capability for its system. By sharing the development, we found we could afford a new advanced technology display. This led us to the next step, a cooperative effort wherein a joint need and joint funding resulted in the development of a new display for the Hawkeye.

Integration of the new display into the aircraft required development of a new tactical software program for the aircraft. The tactical program tells the central computer how to recognize, evaluate, and combine inputs from the sensor systems; and how to display these to the operator. This last function is performed by the display subprogram. The multiple new features of the new display (including

color) virtually ensured that multiple early changes were going to be required to optimize the output. Initially, Egypt and the United States were going to update their own programs; however, the expense of such a course again became an impediment. Moreover, it was recognized that while there were differences in tactical programs, the display should be almost identical.

We decided to seek a common solution and share not only funding, but other resources required. The development program was undertaken as a Nunn Amendment Cooperative Development Program. This is not an FMS program. Each participant funds his effort out of national funds. Each has his strengths to contribute: Egypt had a sophisticated software facility and trained programmers; the USN had years of operational experience with the E-2C and programmers with an intimate knowledge of the E-2 tactical program.

The deal was struck to combine these resources and develop a common display subprogram. Egypt will benefit by more fully using its software lab, by gaining experience with the tactical program, and by reducing cost. In fact, we both benefited not only from reduced costs, but from shared ideas, development of an interoperable system, and development of professional ties between our respective software support activities.

### A Central Unit

The Hawkeye also has benefited from application of technology developed independently by our allies. The navigation system needed updating. The Global Positioning System (GPS) and Joint Tactical Information Data System (JTIDS) were being added to the aircraft. A new, smart, navigation display was required but development of a new system would have been expensive, in terms of money and time.

- E-2A Introduced in 1961 (59 A/C)
- E-2B Introduced in 1969 (CILOP)
- E-2C Introduced in 1971 (Increase UE) P<sup>31</sup>

1971 APS-120	1978 APS-125	1984 APS-138	1988 APS-139 UDP Group I	1990 APS-145 UDP Group II
Auto Detect/ Track Overwater	Addition of Basic Auto Detect/Track Capability Overland	Compatibility with Trac-A Antenna	Improved Surface Surveillance Detection and Tracking	Improved Auto Detect/Tracking Capability in All Environments (Environmental processing and triple pulse rept frequency)
Manual Detect/ Track Overland			Four-Fold Increase in Computer Track Capacity (HSP)	
<u>Limited ECCM</u>	<u>Improved ECCM</u>	<u>Improved ECCM</u>	<u>Further ECCM Improvements</u>	<u>Automatically Optimize System</u>
	• Addition of sidelobe canceller loops to suppress threat jamming	• Add'l sidelobe canceller loops	• Add'l improved narrow band cancellers to improve operation in EMI environments	Extended Radar Radar Range
	• Addition of narrow band filter to improve operation in EMI environment	• Delta on sum technique reduces main beam jammer impact	• Auto channel monitoring and selection	Addition of Auto Detect/Track in Heavy EMI
		• Improved operation in EMI environment	• Improved sidelobe cancellation	Improved IFF
			• Performance assessment of threat detection (Multi-ring test targets)	

Fortunately, Canadian Marconi had developed a beautiful system, the Multifunctional Control Display Unit (MFCDU) that promised to combine various displays into a central unit. This system was evaluated as a Foreign Weapons Evaluation program and found to fulfill that promise. The system is now going into the Hawkeye.

While not development, exactly, we have shared resources in another area that promises significant mutual benefit; and the release of resources to other efforts. The follow-on logistic and technical support required to

sustain day-to-day operations is being accomplished under unique contractor efforts for the individual operators. Not only is this inefficient with six individuals each waiting to be called on each problem; but they aren't talking together and the collective wisdom is not being fully developed. We are copying the Air Force here and developing an E-2C Consolidated Support Program wherein one integrated support structure will provide for the sustaining needs of all users.

#### Shared Efforts

Similar benefits, to a greater or lesser

extent, have been gained through our other cooperative partners. Cooperative efforts work. The Navy has benefited; our other users have benefited. Today, the Hawkeye faces a future shaped by budget restrictions, higher costs and competing requirements. In that environment, we are committed to the belief that only through shared cooperative efforts, through fully capitalizing on technological strengths of our allies, can we affordably meet needs of the future.

Cooperative development is a win-win idea whose time has come. Recognition of the potential it offers can add a new dimension in support of virtually any program.

# THE EVER-CURRENT ISSUES IN OT&E

Dr. Ernest A. Seglie

In early 1990, about six months after Clif Duncan became Director of Operational Test and Evaluation (OT&E),<sup>1</sup> we were talking informally in his office. He said he had concluded that being DOT&E was an old man's job; that one did not make friends if one did this job forthrightly; and that the pressures to worry about a career after this job might consciously or unconsciously inhibit a younger person who had to worry about supporting a family and subsequent employment.

The reason, of course, is that operational testing too often brings home the bad news that a system is not all that it was hoped to be. During his tenure as DOT&E, Dr. Duncan consciously and consistently worked to change and improve weapons development so that the systems turned out as they were hoped to be.

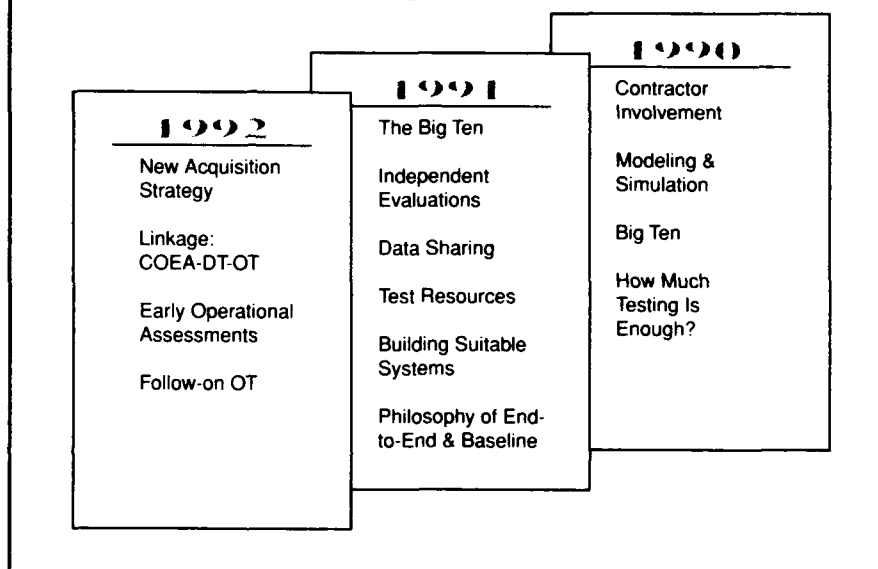
One forum for him to push change was the Operational Test Agency (OTA) Commanders' Conference held every six months. At this conference of the OTAs, he could bring up items that would improve how OT&E served the acquisition of good systems. He also could highlight areas of concern.

## Still Current Issues

Figure 1 lists the DOT&E agenda items during 1990, 1991 and 1992

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**FIGURE 1. DOT&E Agenda Items**



conferences. These items were the current issues during those years. I believe that they are more. They will always be the current issues. Five years from now they will be the current issues, even if the buzz words used to describe them are different.

Even if there is no longer a separate office of DOT&E, those who must make the big decisions on weapons systems will need OT&E information, and these will be the issues that will concern them. In other words, I believe they are close to being a complete set of ever-current OT&E issues.

Proof of this is that they are now beginning to repeat themselves. For example, in 1990 "How much testing is enough?" was an issue. In September

of 1992, the National Research Council sponsored a 2-day workshop of academic and Defense Department workers on statistical issues in defense analysis and testing, and the issue was: "How much testing is enough?"

In late 1993 or early 1994, the International Test and Evaluation Association and the Military Operations Research Society will cosponsor a symposium with the title "How Much Testing Is Enough?" The issue will not go away; we will only get better at addressing it.

The same thing is true with contractor involvement. There were changes to the law in 1989 and in 1992. There are proposed changes to



the law again this year. These issues just keep coming up. I propose to go through them, starting with the most recent. Each year had an overarching theme: 1992 was the year of response to the new world order; 1991 contained the nitty-gritty changes; and 1990 was the first blush.

## 1992: The New World Order

During 1992 the world was reeling from the dramatic changes in the world order. The Defense Department was attempting to respond. Everyone wanted to know how the changes would affect Department business. With the change of administrations in 1993, that question is still relevant. The OT&E must understand each new acquisition strategy that the Department adopts so that OT&E can supply relevant information in a timely way.

## The New Acquisition Strategy

One of the consistent themes in all the discussions of new acquisition strategies is that we will produce less, but know more about the systems we produce. In the January 1992 *Report to the President and Congress*, Defense Secretary Dick Cheney said:

With the collapse of the Soviet Union, we no longer face a global adversary able to field large quantities of increasingly advanced weapons. As a result, we can afford to take more time before we move new weapons systems to production. We can concentrate on research and development, operational testing, and the upgrade of existing systems, to ensure we maintain the technological edge we require.

When Mr. Les Aspin became Defense Secretary, we sought evidence of what he had thought about operational testing prior to becoming Secretary. In February 1992, then Representative Aspin talked about a



*The Honorable Les Aspin  
Secretary of Defense*

comprehensive resource strategy. It had four parts:

- Selective Upgrading
- Selective Low-Rate Procurements
- Rollover Plus
- Silver Bullet Procurements.

He discussed each in turn, but let me quote him on rollover plus:

...But our current system for developing and fielding advanced systems is also no longer sustainable. We don't have the relentlessly modernizing threat to counter and we don't have the money to do it, anyway. The replacement is 'rollover-plus'....First, there's the rollover part of the system. Here, we would continue to prototype new systems and components but not put them into production until stringent criteria are met. Those criteria are A) that the technology works, B) that it was required by development of the threat, or C) represented a breakthrough that would alter battle-field operations.

Second, there's the manufacturing technology and operational testing. They are the new active ingredients in 'rollover-

plus'...it would require the resultant prototype to be 'production-representative,' and would thoroughly test prototypes of promising technologies and systems in an operational context.

Let me explain. Traditionally, prototypes have been developed to provide a range of information: to resolve technical questions about new technologies, provide insights into a system's appearance and spatial layout, and to test sub-component integration into a system. 'Traditional' prototypes, therefore, have been developed primarily to understand *technical performance issues*. Although the resolution of technical performance issues is a key of any prototyping strategy, our 'prototyping-plus' strategy incorporates two additional objectives: *manufacturing producibility* and the resolution of *operational performance issues*.

I conclude from these remarks that while the need for production is going down, the need for information is going up. Any future acquisition strategy, when considered honestly, will have to make testing address operational issues about the system under consideration. The new acquisition strategies require information earlier, and in spite of the possibility that the system may not be produced.

The first point is, then, that the Department needs good information early, and cannot afford to have things go all the way to OT before finding the faults. The test-fix-test again may be too expensive. The alternative is to try to get it right the first time; to keep everyone's eye on the goal from the very beginning. That is what the next two thrusts are about.

## Linkage: COEA-DT-OT

At Milestone I the program has to present a Cost and Operational Effectiveness Analysis (COEA) to the

Defense Acquisition Board. At the same time, the program presents an Operational Requirements Document (ORD). The weakness of the ORDs is legendary. However, the COEA often presents a clearer picture of what the sponsor wants the system to do.

The COEA puts the system in a scenario; develops measures of effectiveness and suitability; analyzes simulated battle results; and provides justification of the expenditure of the billions of dollars that the new program costs. At the same time, the Test and Evaluation Master Plan (TEMP) is first submitted.

In the past, these documents have had little to do with each other. Most testers have never seen a COEA. At least one Service fought hard to prevent any linkage between these documents. They looked at the COEA as a box to check to satisfy OSD, and not as a management document that justified the route chosen.

The USD(A), PA&E, and DOT&E looked on the situation rather differently. The current guidance is that the same measures of effectiveness (MOEs) and criteria will be used to measure the progress of the program from the COEA through development to operational testing. Enforcing consistency ensures that everyone has their eye on the same goal. There is a second way of doing this, discussed in the next section.

### **Early Operational Assessments**

When DOT&E looked for reasons why systems have trouble in OT, he found there is often a breakdown in communication during development. The user defines the need; the developer is tempted to say, "Thank you, I'll get something that meets this need. Now step out of my way." The user disappears for the next 14 years during system development.

The children of the original user then get this thing to test. The proof

**FIGURE 2. The Big Ten**

## **I-IV**

**Evaluations...are too optimistic.**

**Reports to Congress are incomplete and inaccurate.**

**Problems and limitations of OT are not reported.**

**Testing uses "golden crews."**

**Testing is not realistic and objective.**

## **VI-X**

**There is too little "stress" on equipment and personnel.**

**On-site observations by staff are infrequent.**

**DOT&E reports are [rubber stamp] of Service test reports.**

**Inadequate resources are provided.**

**Difference between OT and DT is blurred.**

of the disconnect: after 14 years of development, the user redefines the requirement weeks before the final production decision; sometimes requirements are completely disavowed.

One way to avoid such surprises is to examine the system from the operational point of view throughout development. This is the role of early operational assessments.

Some of us believe that good developmental testers know what the problems are. Many DTers have said as much to me. Many of them also have personally complained to me that while they know the problems, they are not listened to very sympathetically, and they are not free to make the problems visible: Their test reports belong to the program office (funding for the developmental tests comes from the program manager).

To give visibility to system features important to effectiveness and suitability, the Director has established the policy that the DOT&E must ap-

prove, in writing, plans for operational assessments that support the commitment of funds.

### **Follow-on OT**

Recall that many of the reports the Director signed had negative conclusions or caveats; for example, the report would say that "The system is effective and suitable, except for reliability." When that occurred, the Director often reported that the Service would not field the system until a fix has been proved in Follow-on Operational Testing (FOT&E).

Part of the reason to put such assurances in the report to Congress was to help guarantee that the tests actually occurred. This has been a successful, albeit expensive, strategy.

On the other hand, we had not been diligent in reporting the results of that FOT&E to Congress. We will in the future explicitly report to Congress on the outcome of such FOT&E.

Remember that the motivation for all these actions is to keep visible the goal: to give our country effective and suitable systems that increase our military capability.

### **1991: The Nitty-Gritty The Big Ten**

The Director made a list of criticisms and complaints of those involved in OT&E. This list, and the commitment to address the criticism, was part of the Director's confirmation hearings. (Figure 2).

With such a visible and high-level commitment, this office has diligently worked to improve OT&E in all these areas. Many of the criticisms are interrelated. The lack of on-site observation, the rubber-stamp observation, the problem not reported, and the optimistic assessments all required this office to assume more responsibility for its evaluations. This it has done.

### **Independent Evaluations**

The best way to address the criticism that the DOT&E just rubber-stamped the Service test agency reports was to take responsibility for doing a report based on our own analysis. The DOT&E began to do that. This also addresses the criticism that the reports were too optimistic; the reports are now truly DOT&E's.

What has happened, and I expect will happen more often in the future, is that the Director will develop an independent evaluation plan. This will be available to the Services and will be the basis of the Director's determination of the adequacy of the TEMP and operational test plans.

After the test, the independent evaluation plan will be the basis of the DOT&E evaluation. The "basis of evaluation" means that *at least* those items included in the plan will be considered. It never means factors discovered during the test will be ignored.

*If you don't plan to  
test a piece, there is  
little incentive to  
give that piece the  
same attention as  
something you are  
going to test. The  
result is clear. The  
country eventually  
pays for it.*

### **Data Sharing**

To do the analysis and evaluation independent of the Service requires that DOT&E have access to the data in a timely manner. The law guarantees that DOT&E have access to all data that DOT&E determines is necessary to do the evaluation. In some cases we plug directly into the computers as data enters the database.

### **Test Resources**

The inadequacies of resources were also part of the Big Ten. The only time to deal with this without major disruption is early; i.e., before the program is a program or when the acquisition strategy is being formulated. Document this in the Test and Evaluation Master Plan.

### **Building Suitable Systems**

Another effort to get good systems was a study to identify systemic problem areas. The Director's job is deceptively simple concerning acquisition programs. Before a system can go to full-rate production, the Director must send a report to the Secretary and the Congress stating that the test was adequate and that the test confirms that the system actually tested

is effective and suitable. Weakness in suitability is the biggest systemic problem. Suitability includes reliability, availability and maintainability. (Figure 3).

The reports to Congress often said the systems were effective without caveat; they rarely said suitable without caveat. They said for example, "Suitable, except for reliability," or "marginally suitable," or "potentially suitable."

The DOT&E explored the causes of this in a study he commissioned by the Logistics Management Institute. The study compared the field experience to the OT results and concluded that OT found most of the significant problems in the tested items.

What they also found was that significant problems often existed in the items not tested; for example, the logistic support system. This is a good rule to remember: If you don't plan to test a piece, there is little incentive to give that piece the same attention as something you are going to test. The result is clear. The country eventually pays for it.

The study's other major critique of OT was that it often did not have enough test hours to get a full appreciation of the reliability problems. One program especially singled out was the AH-64. The test did not have enough hours for even one aircraft to get to phase maintenance.

Their recommendations were:

- Devote more attention and technical effort to suitability
- Improve responses to problems detected
- Use data and insights from all phases and technical disciplines
- Ensure that critical items of peculiar support equipment are identified, included in test plans, and made available for OT.

Most of the life-cycle cost of systems comes from suitability concerns: spare parts, logistics support, etc. Decision-makers' interest will increase as budgets go down.

### **Philosophy of End-to-End And Baseline Testing**

If you want to know how the office of DOT&E would approach a problem, consider that we will always want to know what the system adds to the military capability of the country. This may be confusing to developmental testers. The developmental testers look at contract specification compliance, and the subject of military use is over the horizon.

But of the five reasons for doing DT enumerated in 5000.2, only one has to do with specification compliance. The others are to inform about operational limitations, technological limitations and risk, cost-performance trade-offs, and readiness for operational test and evaluation.

When operational testers look at a system from the point of view of their military capability, they use the measure of mission accomplishment.

An example may help here. Say a new surface-to-surface missile is being developed whose navigation is so good it can come very close to wherever you aim it. As a result, its warhead need not be so big.

When the operational testers look for mission accomplishment, they ask: What is the targeting system? Is the targeting system accurate enough to support the missile? Said the other way round, is the missile supportable with current intelligence assets? You might not think that is an appropriate question, but it is a design question of importance.

If the target location is not very accurate, then designing for high-placement accuracy is not worth much money. The small warhead may be a

### **FIGURE 3. Suitability is defined in the 5000 Series**

**“The degree to which a system can be placed satisfactorily in field use with consideration given to availability, compatibility, transportability, interoperability, wartime usage rates, maintainability, safety, human factors, manpower supportability, logistics supportability, natural environmental effects and impacts, documentation and training requirements.”**

mistake. These are design questions to be considered at the very start of the program. Remember that OT looks at the full mission, end-to-end (Figure 4). Since DTers have not done that kind of thing, OTers will reduce the risk of surprise by trying to pick up such disconnects in their early operational assessments.

The second aspect of the testing philosophy that DOT&E has pursued is baseline testing; that is, include the current way of doing the mission in the test. There are two reasons for doing this.

First, this calibrates the test. The only way to really answer the criticism that the tests were too easy and results were optimistic is to test the way we would do the mission today.

If the test scenario and threat represented is too easy, even the old way of doing the mission would look good. Including a baseline is a calibration that compares the test to the expectations examined in the COEA. By direction, the COEA includes the current way of doing the mission.

The second reason for doing a baseline is that systems often fail to

meet the stated requirements. The question around the DAB table is then: "Is it still worth buying?" When that question comes up the answer is always "It is so much better that the current system." When asked if the test confirms this, the DOT&E answer should be "Yes, we tested the old system and the new system, and the new one is x times as good."

We cannot say that if we have not tested the old way. We don't know if the new system is better than the old. The purpose of testing is to gain information.

If the information most often desired is how much better the new system is than the old, then the tester should plan to get that information. (Don't be put off by those who say that is not the requirement; that is the question most often asked when systems fail requirements.)

### **1990: First Blush The Big Ten**

The "Big Ten" were first mentioned in OTA meetings in 1990. As you can see, they come up repeatedly. Most members of the DOT&E office carry a copy around with them.

## **FIGURE 4. Operational Effectiveness**

“The overall degree of mission accomplishment of a system when used by representative personnel in the environment planned or expected (e.g., natural, electronic, threat etc.) for operational employment of the system considering organization, doctrine, tactics, survivability, vulnerability, and threat (including countermeasures, initial nuclear weapons effects, nuclear, biological, and chemical contamination (NBCC) threats).”

### **Contractor Involvement**

The law addresses contractor involvement in two ways. First, no person employed by the contractor for the system being tested may be involved in the conduct of the operational test and evaluation required to support going beyond low-rate initial production. The limitation does not apply to the extent that the Secretary of Defense plans for persons employed by the contractor to be involved in the operations, maintenance, and support of the system being tested when the system is deployed in combat.

If you want a way to think about this, it is the following. After development, and after the low-rate initial production, the question is: “Is the government ready to accept this into America’s arsenal?”

The answer is “No” if the military is not ready to accept it, or needs contractor support to operate or maintain it (in ways not planned for during combat).

The second prohibition is that a contractor who has participated in (or

is participating in) the development, production or testing of a system for a military department or defense agency (or for another contractor of the Department of Defense) may not be involved (in any way) in the establishment of criteria for data collection, performance assessment, or evaluation activities for the operational test and evaluation.

(An additional paragraph in this section of the law was added in 1992: “The limitation in subparagraph (A) (above) does not apply to a contractor that has participated in such development, production, or testing solely as a representative of the Federal Government.” The meaning of this subparagraph is unclear, and the General Counsel has advised us that it does not change anything because contractors do not act as representatives of the government.)

### **How Much Testing Is Enough?**

Before the Department of Defense buys a major item, the law requires a field test of the equipment. While the law specifies that the test will be a field test, it provides no guidance on

what is adequate; i.e., how much field testing is enough?

The DOT&E must determine the adequacy of the test as well as the number of low-rate initial production items needed for an operational test. With new acquisition strategies being formulated, more time available, and all defense activities under budgetary pressure, it is desirable to have a sense of how much is enough.

There are two aspects to the “enough” question: an engineering/operational aspect, and a statistical aspect. Say the system must be tested under three different climatic conditions because the equipment is expected to work in the desert, in the jungle, and in temperate climates.

Say also that soldiers require that the system be tested in two different ways because it will be used in two very different ways: to do reconnaissance, and to direct artillery fire. In such cases, then, the system should be tested in a number of different scenarios.

How many different scenarios to test is a difficult engineering (and operational) question: Should the effectiveness and suitability be confirmed in each scenario, or in a representative sample of scenarios, or in the most difficult scenarios? There is even a question of how many forces to represent in each scenario, a question that plays an important role in determining the cost of the test. These are engineering and operational judgments that modeling and simulation can clarify.

For even a single scenario, the number of field trials must be determined. Assume initially that one scenario is sufficient; that there is very clear definition of what the measure of effectiveness is (for example, the probability of destroying a target with a single weapon); and that the passing value for the measure is known.

To determine the sample size, more information must be specified. Usually this information could be specified by stating the confidence level desired for the estimation of the parameter (the *alpha* and *beta* risks). But who specifies this confidence level? Not the law. Usually not the user, who doesn't think about such things. But what confidence level should be used?

I believe that is often a business decision. Let me give you some examples to consider. The first example demonstrates that a small test is not always a better test, even from a business perspective, because small tests increase the chance that a good system will fail.

### **Risky Tests**

Consider a hypothetical test plan for a smart artillery round. Almost a billion dollars have been spent on research and development. If the rounds are bought the total cost may be \$4 or \$5 billion, and the ultimate cost of a round is somewhere between \$11,000 and \$25,000 per round. The test has only a small number of rounds because of "funding constraints."

As a result, the proposed test creates a risk that we reject a "good" system with a probability of 0.35 to 0.45. On the face of it, this does not appear to be a smart test. The question is: "Is there a rational way to argue such issues?"

I believe that good management and smart business demand that we look explicitly at these questions in the future.

### **Minimizing Current Cost by Using Reliability Growth Theory**

The munitions example above illustrates how the desire to reduce the apparent current cost of the program can influence test design. The next example concerns an attempt to save

## **FIGURE 5. Task Force Report**

**“Do not employ simulations to prove or disprove things, but instead exploit their ability to isolate high sensitivity areas. Simulation has an important role in providing sensitivity analyses, and as a method of focusing on system engineering issues early through operational tests.”**

*Report of the  
Defense Science Board Task Force on  
Improving Test and Evaluation Effectiveness  
December 1989*

missiles for the wartime stockpile rather than use them up in testing.

In this example, the total buy of missiles is about 1,000. The test program launches only 10 to 15 missiles because of a desire to save missiles for the stockpile. One of the complexities of testing in the real world is that the configuration (design) tested is sometimes changed in the middle of the test because the early part of the test reveals a specific failure mode. This is often the case when early reliability is poor. The change is designed to remove the failure mode discovered.

Thus, it is asserted that the reliability "grows" as more testing occurs. (This is a misnomer; the reliability improves as the design gets better.) Reliability growth curves are produced that predict the reliability as a function of the number (or hours) of test firings. The proposal is made to begin to trace the reliability growth and to project it out to its asymptotic value.

When the asymptotic value meets the user's reliability criteria, the proposal continues, we should stop op-

erational testing. Experience with other systems led to the belief that 10-15 missiles would be sufficient to project such asymptotic behavior.

The proposal is in error in a number of ways. First, if one were to stop testing, one would miss the chance to find and fix additional faults. The reliability would not grow.

Second, it is probably not appropriate to use a projected value of reliability to answer the requirement of the law that the test *confirm* the effectiveness and suitability of the system for combat. Remember that DOT&E reports the as-tested values.

Finally (and this is the critical question), it is fair to ask whether the number of missiles in the stockpile should be maximized, or the number of *reliable* missiles in the stockpile should be maximized. This addresses the criteria used in the proposed test. The proposed test assumed some knowledge of the reliability growth parameter. Using this number, the test size could be calculated which would maximize the number of *reliable* missiles in the remaining stockpile.

Such an approach asserts that the test should stop when the expected increase in reliability (as a result of the next test firing) as applied to the remaining missiles increases the total number of reliable missiles in the remaining stockpile by less than one. In the case in point, applying typical growth parameters, the number of test missiles might be on the order of 100.

Such a proposal also raises the question of how much testing should be done to confirm the assumptions by which the statistician will analyze the data; in this case, the assumptions made in the reliability growth model. This question often is ignored when applying statistical models or theories.

Some confirmation is needed that the assumptions are appropriate. What is the penalty for not testing the assumptions? What tests should assumptions pass before they are accepted?

## Modeling and Simulation

In tests, large sample size compensates for the expected random variability of results from trial-to-trial. Models and simulations can help plan tests by directly addressing the variability (Figure 5).

For example, a missile disperses submunitions over a large area to attack convoys or assembly areas; the plan asserts that only 10 missiles can be fired, and therefore no statistically valid conclusions can be drawn. These 10 shots are for demonstration only. When asked why no valid conclusions could be drawn, the answer is the variability of results from such a small sample size.

If the criterion against which the missile is judged is the number of vehicles stopped in the convoy, then the variability of that number from missile firing to missile firing may be a complex thing. A mathematical model of the system demonstrated

that the "small" sample gave results clustered rather closely.

Thus, the variability that would require a larger sample size may not be there, and the small sample size may be adequate.

Between models and testing, the best relation may be one of complementarity. The model can help formulate hypotheses, which can then be tested directly. Smart use of the model might lead to better tests. Usually, the variability of the outcome from trial-to-trial is important information that the model could supply to test planners.

Not all models calculate correctly the variability that occurs on repeated runs. Insisting that models attempt to capture the variability may lead to better and more useful models. Again, the variability of results from trial-to-trial and from mission-to-mission should affect not only the size of the test, but how the military would plan to use the system.

For example, highly effective surface-to-air missiles might be fired according to a doctrine of shoot—look

(to see if it hit)—shoot. A less-effective missile might fire according to a shoot-shoot-look doctrine.

## Conclusion

This review of specific issues and actions during the last few years can serve as a guide so that you should always know where the OT&E person is coming from:

- Military capability and mission level testing, not "black box" testing
- Get in early to make problems visible at a time when they can be fixed
- Keep the user in the loop
- Do independent analysis and reporting.

If there is a core value within the OT&E community concerning acquisition it is the following: Ensure that the operational effectiveness and suitability of weapons systems are tested adequately, evaluated objectively, and reported independently to acquisition decision-makers.

If the system works right, even younger persons can become DOT&E.

## Endnotes

1. In 1983, the Congress established, within the DOD, a Director of Operational Test and Evaluation. The Director is the principal advisor to the Secretary of Defense on operational test and evaluation within the Department and shall prescribe policies and procedures of the conduct of operational test and evaluation. Title 10 of the U.S. Code defines operational test and evaluation. It means (within that section): (i) the field test, under realistic combat conditions of any item of (or key component of) weapons, equipment, or munitions for use in purpose of determining the effectiveness and suitability of the weapons, equipment, or munitions for use in combat by typical military us-

ers; and (ii) the evaluation of the results of such test.

Title 10 requires that a major defense acquisition program may not proceed beyond low-rate initial production until initial operational test and evaluation of the program is completed. Further, it requires that the Director shall analyze the results of the operational test and evaluation conducted for each major defense acquisition program and prepare a report stating the opinion of the Director as (A) whether test and evaluation performed were adequate; and, (B) whether the results of such test and evaluation confirm that the items or components actually tested are effective and suitable for combat.

# LEAN PRODUCTION

## *A Focus for Defense Procurement Success*

*Major William B. Vance, USAF*

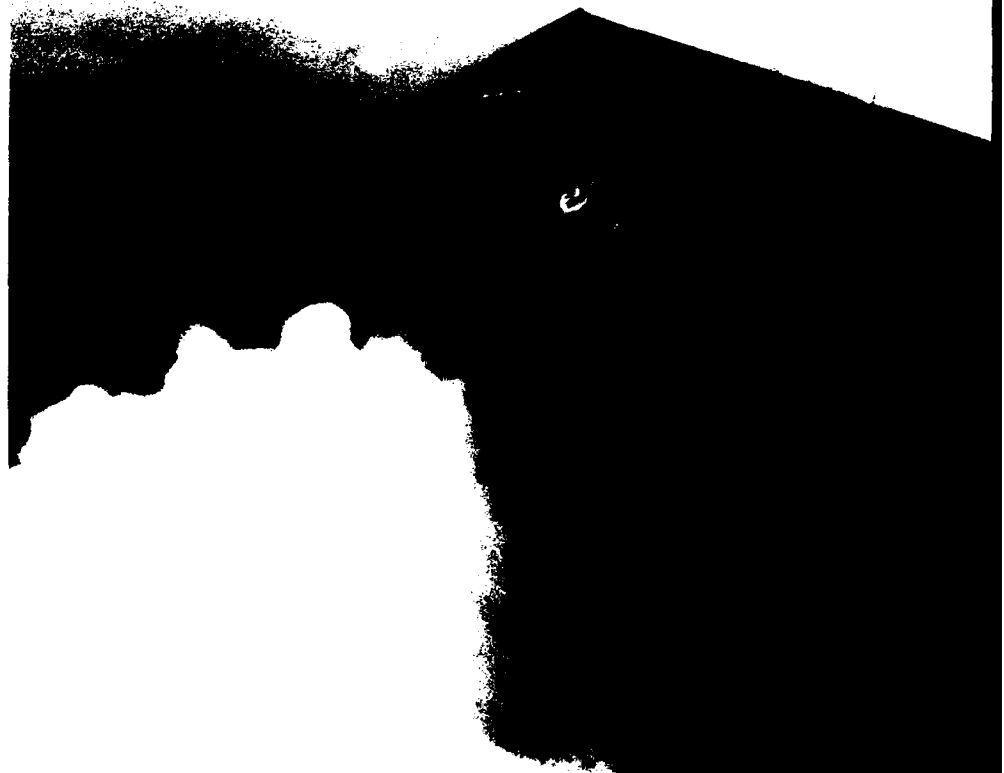
**A**bout the defense budget, I raise a hope and a caution. As we restructure our military forces to meet the new threats of the post-Cold War world, it is true that we can responsibly reduce our defense budget. Now, we may all doubt what that range of reductions is, but let me say that as long as I am president, I will do everything I can to make sure that the men and women who serve under the American flag will remain the best-trained, the best-prepared, the best-equipped fighting force in the world, and every one of you should make that solemn pledge.

**—President Bill Clinton**  
**State of the Union Address**  
**February 17, 1993<sup>1</sup>**

Collapse of the Berlin Wall in 1989 gave the world visual confirmation of a hidden suspicion. The United States had just won the Cold War by spending the Soviet Union into virtual bankruptcy. American weapons acquisition decisions, particularly those made in the post-Vietnam era, had forced the U.S.S.R. to develop defensive

counters and initiate new offensive programs. The resultant arms race was a classic war of attrition, yet one most decisively fought on an unconventional battlefield—the balance sheet.

Outcome of the Cold War has presented the United States with a predictable set of circumstances: (1) sole military-superpower status, (2) freedom to downsize the military due to the smaller size of any foreseeable



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adversary as compared to the former Soviet Union, and (3) ability and need to contribute the resultant excess defense dollars toward servicing the national debt.

Our national leadership must use these new circumstances as a baseline for future strategy decisions. Indeed, the National Security Strategy of the United States acknowledges the realities of these circumstances in its introduction to Section V, the Defense Agenda for the 1990s, which "...will guide our deliberate reductions to no more than the forces we need to defend our interests and meet our global responsibilities."<sup>2</sup>

**Weapon systems...  
will still need to be  
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**Quality people will  
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**In contrast, money  
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saved.**

## **Uncomfortable Dilemma**

Unfortunately, this reduced spending level for personnel and weapon systems suggests a very uncomfortable dilemma. We now have the best military force the United States has ever fielded, both in the quality of troops and equipment.

However, the passage of time and the nature of man and, consequently, man's propensity toward conflict, still remain unchanged. Weapon systems, provided by a robust defense industrial base, will still need to be fielded. Quality people will still need to be trained. In contrast, money will still need to be saved. The national debt and the now ambiguous threat mandate satisfaction of each of these needs, even though they are in conflict.

The resultant, rapidly increasing competition for scarce resources, caused by both defense structure reductions and budget reductions, could diminish our ability to act decisively as a world leader, and even render us unable to defend our national interests or execute our international responsibilities.

## **Factors Invalidating the Historical Approach**

The United States is witnessing the need for a dramatic shift in military thinking. Contemporary military strategies must be based on the need for defending our national interests in an increasingly complicated politico-military environment rather than for defending against a Cold War superpower threat. The inherent reductions in force structure required by this shift in thinking mandate fewer but necessarily smarter weapon systems.

To that end, the Department of Defense (DOD) has described a new acquisition strategy that no longer routinely requires conceptual or developmental systems or technologies to pass into the production phase. Emphasis will be placed on developing



F-117

### **A Few Definitions Are Appropriate for Terms Used in this Paper**

**Acquisition Strategy:** A program manager's written plan to satisfy the mission need. This paper also refers to acquisition strategy as DOD's overall approach to defense procurement.<sup>4</sup>

**Acquisition Program:** A formal program that may result in the acquisition of new defense procurement. Establishment of an acquisition program occurs at Milestone I, or Concept Demonstration Approval, and requires competitive prototyping, a step beyond Advanced Technology Demonstrations used during concept exploration.<sup>5</sup>

**Production Concept:** That part of a program manager's acquisition strategy that defines the rate and quantity of item production.

**Production Approval:** Milestone III of the Defense Acquisition Process.<sup>6</sup>

technologies and production-level manufacturing techniques for future use. More emphasis will be placed on technology insertion and improvement of current systems, rather than on initiating new starts.<sup>3</sup>

Further, to save money in the short term, many acquisition programs have been postponed, stretched into future years, or canceled outright.

Although this strategy is in compliance with the policy of saving dollars while still attempting to provide needed capability, at what cost to the nation and our future defense industrial capability is DOD following this strategy?

### **Reconstitution**

One of the pillars of our National Security Strategy is reconstitution, using our defense technology and the U.S. defense industrial base as the means.<sup>7</sup> Although funding levels for science and technology remain stable for now, our acquisition strategies of necessity require a large reduction in production dollars.<sup>8</sup> If production is

allowed to decrease to insufficiently profitable levels, contractors may elect to cease operations. Their technical bases, processes and equipment may be lost forever. General Dynamics, for example, (prior to the sale of its fighter production line to Lockheed) required a minimum economic production run of four or five F-16s monthly.<sup>9</sup>

Granted, processes may be documented and manufacturing equipment mothballed; however, highly skilled and focused teams—such as Lockheed's Advanced Development Company, the "Skunk Works"—should they disband from lack of profits, may be impossible to reassemble should the nation's military require reconstitution. Our reliance on technology as a force multiplier, and ultimately as a battlefield lifesaver, renders the loss of the defense industry's brainpower, complicated technical processes, and its highly trained workers strategically unacceptable.

### **Weapons Platforms**

The reduction in absolute numbers of weapons platforms is a fact in this new era. Civilian and military decision-makers at every level must exercise careful judgment to decide how much reduction is too much, and then prevent it. In a statement some critics might call uncharacteristic, Air Force doctrine, though generally praising and usually depending extensively on high technology, specifically acknowledges the fact that numbers do matter:

Advanced technology is crucially important to aerospace forces, but numbers are also important. A small, technically sophisticated force could be overwhelmed by a huge but unsophisticated force—that is, at some point quantity can overwhelm quality.<sup>10</sup>

The direct result of a policy that would reduce actual numbers of op-

erationally assigned systems faster than reducing manpower would be a decrease in the amount of hands-on training available to the war fighters. Out-year DOD budgets acknowledge this shortfall and propose large increases in training and simulation dollars for all the Services as an attempt to compensate.<sup>11</sup> Nevertheless, from my viewpoint as an operator, there is nothing as good as the genuine article to train for the fog of war.

### **Gutted Budgets**

Post-Cold War budget reductions have truly put the defense establishment on the defensive in an effort to avoid another hollow-force era. America is proficient at fielding high-technology, and usable, stalwart weapons. The fall of the Berlin Wall, followed by the military's decisive Desert Storm performance, attests to the wisdom of our previous approach to defense procurement. Now, facing gutted budgets, DOD is constrained by decreasing manpower levels and weapons platforms, and the consequent erosion of the nation's defense industrial base.

Although some sectors of the defense industry have begun to consolidate in an attempt to alleviate this erosion, this is not widely the case in the aircraft manufacturing sector. *Aviation Week and Space Technology* relates a recent market study released by Booz-Allen & Hamilton that implies "the result is too many firms chasing too few programs. The study predicted that a 'hurricane' of consolidation and restructuring is in the wind."<sup>12</sup> Several defense contractors, for example, are "...marked for extinction as fighter builders..." if the multiservice A/F-X aircraft program is terminated.<sup>13</sup>

### **The Acquisition Dilemma: Tough Answers to Simple Questions**

Solutions are available, however, that provide varying degrees of relief. They also require varying degrees of

commitment and an honest evaluation of which readiness characteristics the combatant commanders consider important for the future defense of our country's national interests. Certainly, the Services' budget increases for simulation will provide operators *artificial experience*.

Artificial experience is described by Ted Gold, Hicks & Associates, Inc., and Rich Wagner, Karman Corporation, in *Long Shadows and Virtual Swords: Managing Defense Resources in the Changing Security Environment*, June 1990. It is essentially that experience gained through simulation rather than by training on operational equipment.

What policies or circumstances will dictate how much simulation is too much? Further, technology insertion as a tenet of the new acquisition strategy will provide interim capability improvements. What happens when the receiving system's preplanned product improvement reserve is miniaturized, integrated and filled to its physical or economically feasible capacity, and there is no room left for improvement?

### Three Questions

In addition, we can emphasize fieldable prototypes or execute acquisition programs through engineering and manufacturing development, intentionally delaying the Milestone III production decision. Technologies could then be shelved, awaiting need. What happens to the defense contractor, tied contractually to the historical acquisition approach, when his profit generator, full-rate production, is removed?

Justification for our future defense posture and, therefore, justification for a predominant acquisition strategy, lies in the obvious answer to three questions. First, is it practical to regain and maintain a robust defense industrial base to enable the reconstitution pillar of our National Strategy?

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Second, is it necessary to provide fully mission-capable training levels to our war fighters, rather than some ill-defined, skills-maintenance training level?

Finally, is it important to have actual equipment available to provide not only realistic training but also quick-reaction, force-projection capability? Analysis of this three-part problem when viewed against a defense budget free fall reveals two approaches to possible solutions—adjustments to our training strategies and adjustments to our acquisition strategies.

### Solution: Training Strategies

Training strategies are composed of three main inputs: money, time on equipment, and time on simulators. Declining budgets combined with fewer weapons platforms result in reduced hands-on training time in operational systems. The clear solution to the

resultant decline in operator proficiency is an increased emphasis on simulation. State-of-the-art simulators provide safety (cats should have as many lives as I've used up in the F-16 simulator), superior visual and auditory fidelity, six degrees-of-freedom motion, long-distance interface with other simulators for mock-combat scenarios against live opponents or even another computer, and greatly reduced operating costs compared to an hour of flying time or M1A1 tank gunnery.

The DOD concurs: "...The Pentagon has targeted training efficiency as a major concern of the post-Cold War era....Playing a big part in the Pentagon's acquisition strategy are cost effective off-the-shelf part task trainers, maintenance trainers and mission rehearsal systems."<sup>14</sup>

The National Training Systems Association in Arlington, Virginia, published a marketing research report that predicts steady growth during the next decade for worldwide military training and simulation budgets, already estimated at \$3 to \$3.5 billion annually.<sup>15</sup> Granted, an increased emphasis on training via simulation is beneficial; but simulators do not project combat power, nor do they execute national policy.

### Trade-off

Increasing the emphasis on our training strategy via simulation as a solution does improve readiness to a degree, but it is incomplete. Every hour spent in simulation is one less hour spent in the actual system.

There is a trade-off between simulator training and hardware training: The performance of a few National Guard units in Operation Desert Storm clearly indicated that in many cases there is not enough training time available to keep units ready for the complex weapons and tactics of modern warfare.<sup>16</sup> If only training and simulation are emphasized, the declining trend in the ability of our

defense industrial base to build combat hardware efficiently is not reversed.

Obviously, actual aircraft or tanks are not added to the inventory to replace phased-out or unusable articles. Training and simulation are not the complete answer. Again, from an operator's viewpoint, there is nothing as good as the genuine article to train for the fog of war.

### **Solution: Acquisition Strategies**

Rethinking acquisition strategies promises a more complete solution than a change in our training strategies. As specified in DOD Instruction 5000.2, Part 3, the production and deployment phase (Phase III) of a DOD acquisition program has historically supplied the country with aircraft, tanks, and other military hardware.<sup>17</sup> Now, although reductions in force structure mandate fewer but smarter weapon systems, technological developments continue at ever-increasing rates; consequently, this historical approach must change on a broad scale.

The DOD new acquisition strategy addresses this need by no longer routinely expecting conceptual or developmental systems or technologies to pass into Phase III. Emphasis may be placed as appropriate on developing specific technologies and production-level manufacturing techniques for future use, putting this technology "on the shelf" or "in the pipeline" until an emerging threat mandates production.

This new acquisition strategy consists of numerous elements but the general trend is toward an approach that, by design, leans heavily on research, development, test and evaluation rather than on production. In short, this approach acknowledges both its current and future financial environments. Concerning that financial environment, Phase III by design has

provided contractors with most of their profits, as DOD contracts historically do not provide for significant profits during earlier phases of the acquisition process.

### **AIA Takes Exception**

Consequently, the Aerospace Industries Association (AIA) takes exception to this new DOD approach:

*The AIA has taken issue with the Defense Dept. plan to perform research and development and then put a design "on the shelf" and defer production. LeRoy J. Haugh, vice president of procurement and financial services at AIA, said the shelf life of technology is not very long, and it may not be possible to keep a design on hold unless there is at least some limited production to demonstrate feasibility. Under the current payment schemes for research and development, most companies would have trouble making any profit at all, he maintained.<sup>18</sup>*

Former Defense Secretary Dick Cheney addressed this common aerospace industry concern at a press conference in January 1992. He specifically said that not only do we intend to develop selected technologies into weapon systems, but that we intend to develop the manufacturing processes to build those systems. He said the Defense Department fully intends to procure such items in sufficient quantity that users can acquire operational experience with the systems as well as develop appropriate doctrine. "We are not talking about just building one or two items and putting them on the shelf," he summarized.<sup>19</sup>

The construction of fieldable prototypes is a production concept that takes advanced technologies a step further than a spot on the shelf. This approach places Advanced Technology Demonstrators (ATDs), normally one-of-a-kind items used to assess

program risk during the Concept Exploration Phase, into the hands of operators for evaluation in realistic operational environments. This is a superb idea for systems not intended for procurement in large numbers; in fact, at this stage of the acquisition process, an acquisition program does not exist—no production concept has been formalized.

### **JSTARS**

Consequently, we must realize that these ATDs are immature, developmental systems: Maintenance and operation must be accomplished by experienced personnel. A familiar example of the fieldable prototype concept in action is the Joint Surveillance and Target Attack Radar System (JSTARS) used effectively in Operation Desert Storm. Unfortunately, with results similar to an approach that just changes our training strategy, a plan that depends on building fieldable prototypes to keep assembly lines open and profits flowing is not the answer.

According to General Lawrence Skantze, USAF (Ret.), former Commander of Air Force Systems Command (now Air Force Materiel Command), Congress will "need to be convinced of the credibility of the ATD project before it is even funded or put through the pre-Milestone I [Concept Exploration] process."<sup>20</sup> The uncertainty of extending a fieldable prototype into a reasonable production run invalidates the idea of using ATDs to train personnel and provide operationally significant numbers of actual hardware.

Clearly, further development of ATDs or shelving technologies at Milestone III are not the ideal production concepts to solve the dilemma of declining numbers of actual hardware, deteriorating operator proficiency, and a decaying defense industrial base. Although Defense Secretary Les Aspin has articulated a four-point program to enhance the defense industrial base,

maintenance of that industrial base is only part of the requirement.

### Acquisition Concepts

In a 12 February '92 address to the American Defense Preparedness Association, and later in his confirmation hearings for Defense Secretary, Mr. Aspin listed four acquisition concepts which would enhance the defense industrial base: "selective upgrading; selective low-rate procurements; rollover plus, which is continued research and development of critical technologies; and silver-bullet procurements, or purchases of highly capable systems with advanced technologies."<sup>21</sup>

A more all-encompassing acquisition strategy might provide perhaps the best overall solution to this three-part problem. Low-rate initial production, recently dubbed lean production by senior Air Force officials, may enable the necessary synergistic effect of sufficient numbers of platforms; a capable defense industrial base; and proficient, combat-ready operators. Lean production is a production concept that supplies small numbers of actual operational platforms at an efficient and profitable pace.

A summary of the concept clearly identifies the advantage:

*Lean production recognizes that in order to have a true operational capability, the system must go beyond the prototyping phase and on into an operational environment. Essentially, this concept says you cannot put technology on the shelf and expect to produce it. [It] implies that the forces in the field must have production items to train with in order to achieve combat readiness.<sup>22</sup>*

### Benefits for the War Fighters

It would appear that the war fighters favor this approach. Lean pro-



General Mike Loh, USAF

**All future weapon systems will be subject to [italics added] low rate production, and the Air Force must work with industry from the beginning to develop 'smart, realistic production strategies' that enable companies to avoid debilitating overhead costs.**

**-February 4, 1993**

duction, as a routinely selected production concept rather than as a Band-Aid for a budget crunch, would govern the procurement of a system from the earliest stages of its acquisition cycle. The war fighters would know

that they would be buying the best available technology.

They would be buying fully developed support equipment and technical data. They would be buying an optimized manufacturing process. Most importantly, they would be buying sufficient numbers of platforms on which to train to mission-ready proficiency levels and to take to combat should the need arise. In short, lean production as a part of the total acquisition strategy buys real capability.

Moreover, the process is inherently stable, a feature much desired by both a volatile, politically motivated congressional process and the defense industrial complex. Conceptually, when a request for proposal is issued with a reasonable assurance that lean production will be the production concept, the contractor will be assured his efforts will produce a state-of-the-art product in sufficient quantities to provide a profit level that will justify the bid.

### Aggressive Steps

Our defense industries are so fragile at this point in our history that aggressive steps must be taken to ensure the undiminished effectiveness of this national asset. Because this situation is critical, future acquisition programs may be driven more by needs of the defense industrial base rather than by operational needs.

General Mike Loh, Commander of the Air Combat Command, addressed a group of more than 800 industry and Service representatives at a February 4, 1993, Air Force Association Symposium with a forceful, precedent-setting speech. He said the Air Force intends to increase support to the defense industry by continuing upgrades to existing systems; by identifying new systems for low-rate production; and by enabling prime contractors and subcontractors to develop advanced operational prototypes

and their manufacturing processes as candidates for future production systems.

Specifically, according to General Loh, "All future weapon systems will be *subject to* [italics added] low rate production, and the Air Force must work with industry from the beginning to develop 'smart, realistic production strategies' that enable companies to avoid debilitating overhead costs."<sup>23</sup> The war fighters are on board with the lean-production concept.

### **Lean Production: A Vision for Success**

A suitable vision of the way a lean production program of the future should look in action is the formerly classified, award-winning program run by the Skunk Works—the F-117A Stealth Fighter.

Two test pilots from the Have Blue flight test program were awarded the Iven C. Kinchloe Award at the 1989 Society of Experimental Test Pilots Symposium. Each year, the award is presented in recognition of outstanding accomplishments in the conduct of flight test activities. The award was presented to Lt Col Ken Dyson, USAF (Ret.), Chief Test Pilot for Rockwell International; and William C. Park, Jr., then Director of Flight Operations, Advanced Development Projects at Lockheed. Both men previously were ineligible for consideration for this award due to the classification of their project. They were the only pilots to fly the radical proof-of-concept aircraft that pioneered current stealth technology and, later, development and production of the F-117A.<sup>24</sup> The F-117A Stealth Fighter program won the internationally recognized Collier Trophy.

In 1976, work began on the Have Blue prototype, and in late 1978 Lockheed received the full-scale development contract. In just more than a decade, the Skunk Works would supply the country with 59 Stealth

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Fighter.**

Fighters. The program moved from design go-ahead to first flight in 31 months and initial operational capability (IOC) in 60 months.

Since the F-117A was essentially a concurrent development, production and deployment program, test pilots conducted flight tests while operators trained in the aircraft and developed tactics. The Skunk Works' Richard Silz said essential testing was completed by IOC in October 1983, but for several years after that flight test continued to fill in missing data. According to Silz, "While this approach to testing worked and is probably in the best traditions of the Skunk Works, flight test is just this year finishing the final reports on the last of the original test plans written over ten years ago."<sup>25</sup>

### **Textbook Example**

Although not a "lean-production" program in the contemporary sense of the word, this silver-bullet procurement is a textbook example of the way an acquisition strategy should

be executed using this production concept. Though few procurements will have the various benefits of classified, or "black" program management oversight, all program managers can learn from experiences of the Skunk Works' team and incorporate those lean-production lessons into their acquisition strategies. A need was determined, a technology was developed, prototypes were built and tested to reduce program risk, and 59 platforms and their attendant support equipment and technical data were procured during the program's production run.

During this production run, an operational squadron achieved IOC and refined its combat tactics. An ongoing flight test program continued to supply operators with valuable data and product improvements. At a unit flyaway cost of under \$43 million, the company produced a superb product at a fair price. Any future acquisition program using the Stealth Fighter paradigm will be complying with the intent and spirit of the lean-production concept. Though previous success is no guarantee of future performance, imitation is the sincerest form of flattery.

### **Conclusions**

General Loh said all future weapon systems will be "subject to" low-rate production. Rather than having future acquisition programs subject only to lean production, by actually adopting lean production as a first-choice production concept on multiple-item programs (as opposed to limited-item programs like aircraft carriers or satellites), the acquisition community would be able to keep contractor teams together and keep assembly lines at least warm.

The genuine article would be available for operator training and operational test and evaluation. Combatant commanders would accumulate actual numbers of combat platforms in sufficient quantity to employ them operationally, but for a longer time

than provided by full-rate production decisions.

The threat is surely ambiguous. The threat is decidedly volatile. The Middle East, the Balkans, and India are defined by centuries-old religious, racial and ethnic conflict; North Korea may field atomic weapons this year and may implode before the end of the century; South America leads the world in drug production and distribution.

Our streets are filled with some of the most violent crime in the civilized world. At the fall of the Berlin Wall and the dissolution of the Warsaw Pact, America rejoiced at the realization of the Cold War victory. Communism was declared bankrupt and the Soviet Union disintegrated into a confused collection of 15 independent states, some of which discovered they were custodians of large conventional and nuclear arsenals.

## Russia

The media hailed President Boris Yeltsin as a visionary capable of bringing the new confederation out of its problems and into the light of democracy. The window of opportunity to assist democratic reform in the former Soviet Union may close as various countries assess and consolidate holdings and define strategic goals.

Recent observations indicate some of these states are beginning defense industries with remnants of the ex-Soviet Union's defense industrial complex. An intelligence community study indicates that Russia, Ukraine, Georgia, Uzbekistan, and Kazakhstan are producing major weapon systems and other military hardware.<sup>26</sup> Mr. Yeltsin probably faces a tenuous political future.

America cannot sit on the sidelines and watch the world go by, hoping no threat will emerge that might disrupt our defense conversion:

**We must  
remember...there  
are states  
that...relish our  
impending  
diminished  
capability to  
respond anytime,  
anywhere, to any  
crisis.**

*[Secretary of State, Mr. Warren] Christopher warned that if Russia were to fall into anarchy or return to despotism the U.S. would pay a "frightening" price. "Nothing less is involved than the possibility of a renewed nuclear threat; higher defense budgets; spreading instability; and a devastating setback for the world-wide democratic movement...."*<sup>27</sup>

Many actors in the world community are not sympathetic with our desire to reduce our military forces or resolve our economic problems.

## Responding To Crisis

Clearly, as we monitor threats throughout the world, we must as a nation remember there are states that opportunistically relish our impending diminished capability to respond anytime, anywhere, to any crisis. Until recently not an issue, our Cold War and conflict-tested military power may soon be compromised; with that, our most important national interests may be indefensible and our treaty obligations unmeetable.

Facing drastic budget cuts and a new threat environment, DOD must lean forward in joint fashion, acknowledging a deteriorating defense industrial base, haphazard decreases in weapons platforms, and the potential for reduced combat capability as a result of insufficient training. Defense Secretary Aspin, during confirmation hearings, said the DOD acquisition system is "increasingly complex and adversarial." He intends to streamline and simplify the process while protecting it from new abuses.<sup>28</sup>

In an interview with the *Air Force Times* that same week, then Defense Secretary Cheney, pointing out that \$1 billion was set aside this year for defense conversion, said, "There is a new tendency in Congress to spend money on what are essentially domestic programs and call it defense."<sup>29</sup>

## Lean Production

Given an appropriate program, the first production concept the program manager should consider when writing acquisition strategy should be lean production. Its application could solve many contemporary defense procurement problems. A lean-production decision would simplify the acquisition process for defense procurement programs, guard against abuses, and focus defense dollars on defense programs.

It would enable more hands-on training on operational systems; supply adequate numbers of operational systems; and provide sufficient business volume and incentive to maintain a viable defense industrial base. Each attribute is a critical and necessary component of any future acquisition strategy.

By directly addressing these issues, a broad application of the lean-production concept would contribute synergistically to the strategic, operational, and tactical levels of our preparation for war. If the acquisition community is to become part of the solution and

assist the President in assuring U.S. forces remain the best trained, prepared, and equipped fighting force in the world, we must acknowledge multipolar threats to U.S. interests and focus defense procurement efforts to protect these interests.

To solve many of our most pressing contemporary defense procurement issues, one initiative stands out—a long-term, first-choice commitment to lean production as the production concept of choice in the program manager's acquisition strategy.

**EDITOR'S NOTE:** Views herein are solely those of the author and do not necessarily reflect those of the Department of Defense or the Defense Systems Management College.

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## FROM OUR READERS

The July-August 1993 *Program Manager* had an article entitled "The Work Breakdown Structure (WBS)—It's Much More Than a Cost Reporting Structure." The article proposed an engineering WBS approach, combining product and process features. The subject is timely because MIL-STD-881B, "Work Breakdown Structures for Defense Material Items," was signed on March 25, 1993.

I agree that the WBS is very important to an engineering community that is not aware of the role it should play in WBS development. I do not agree with the article's proposed WBS redefinition, however, and fear that its publication just as MIL-STD-881B is being distributed will add to the confusion. Despite many good points, the article misrepresents the WBS, and advocates inappropriate use of the flawed draft MIL-STD-499B, "Systems Engineering." MIL-STD-881B is official Department of Defense WBS policy, and was published only after careful consideration of the points raised in the article.

Your readers should refer to MIL-STD-881B, especially the User Guide at Appendix I, to understand how to prepare and use a WBS. My purpose here is not to repeat that excellent guidance, but to clarify a few points raised by the article.

First, the draft MIL-STD-499B, the basis for the article, was not approved because it contained many problems. For example, it would have required all contractors to use as their organizational structure multidisciplinary teams. This excessively rigid requirement will be corrected in the next draft by instead requiring "multidisciplinary teamwork," without specifying how a contractor must organize. The draft also confused the WBS concept by mixing "product" and "process" inappropriately. Unfortunately, the unapproved draft 499B is already being improperly invoked on some contracts.

Second, the reference to the MIL-STD-881 WBS primarily as a cost reporting structure is incorrect. I understand why it may be viewed in that way, given its historical association with the Contractor Cost Data Reporting (CCDR) Plan. In reality, proper program WBS development is very important early in the acquisition process (long before CCDR reporting starts) in order to properly identify summary level products consisting of hardware, software, services, data, and facilities. This did not occur in the F-22 case cited in the article, and it was impractical to correct the WBS retroac-

tively. This problem is avoidable by performing proper up-front planning. The F-22 WBS could have been developed in compliance with MIL-STD-881A without compromising the integrated management approach.

Finally, the article quotes out of context a briefing made by the Air Force support contractor for MIL-STD-881B. I have heard his briefing, and can vouch for his understanding of WBS policy. In fact, the contract includes a task to develop WBS training materials that will be used in all appropriate Defense acquisition courses.

For an excellent discussion of WBS development and use, your readers should read the article in the March-April 1991 *Program Manager* entitled "The 'Hither and Yawn (Yon)' of Statement of Work Preparation." It pointed out "The WBS format was never intended to be enforced verbatim, but used as a starting point for future tailoring by program managers. Rigid task procedures and too much data are issues needing to be resolved within the SPO before solicitation release or contract award. The key point is that the WBS does not drive our requirements. We do. It merely provides the framework." I agree with this view. WBS policy was never the issue; improper (usually excessively rigid) WBS implementation was.

In addition to the User Guide, MIL-STD-881B has guidance for software-intensive applications and for contractors that use integrated product team organizations. Should MIL-STD-499B ultimately be approved, its requirement will be compatible with those in MIL-STD-881B.

Thank you for the opportunity to comment on this article. I trust these clarifications will be helpful to *Program Manager* readers, and will support the author's desire to have engineers stay in the room when the topic of WBS comes up.

Gene H. Porter  
Director, Acquisition  
Program Integration  
Office of the Under Secretary of Defense  
13 August 1993

(The writer is referring to Dr. Jerry Lake's article.)

Thanks for the July-August *Program Manager*. The article on early military aviation is excellent—well-written and nicely illustrated. You tell an important, complex story that is little known or appreciated in historical or management circles.

Harold W. Nelson, USA  
Chief, US Army Center of Military History  
Washington, D.C.

Thanks so much for *Program Manager*; it contains a lot of interesting articles. Best of all was the piece, "Spruce, Dope and Fordism." I enjoyed reading it and passed it along to my staff.

Mr. Jacob Neufeld  
Director  
Center for Air Force History

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# DSMC SESSIONS

## Connecting Ethics and Quality

Dr. Mary-jo Hall

**M**s. Judith Light, a certified management consultant from Colorado Springs, Colo., facilitated several group discussions at DSMC on "Connecting Ethics AND Quality." Using quotes, lecturette, exercises and dialogue, the groups explored the relationships between people and systems. Ms. Light started the recent sessions with the following quote by Margaret Wheatley in the book, *Leadership and the New Science*:

This world of relationships is rich and complex. Gregory Bateson (1980) speaks of "the pattern that connects," and urges that we stop teaching facts—the things of knowledge—and focus, instead, on relationships as the basis of all definitions. With relationships, we give up predictability for potentials. Several years ago I read that elementary particles were "bundles of potentiality." I have begun to think of all of us this way, for surely we are as undefinable, unanalyzable, and bundled with potential as anything in the universe. None of us exists independent of our relationships with others. Different settings and people evoke

some qualities from us and leave others dormant. In each of these relationships, we are different, new in some way.

Ms. Light suggested that as an outgrowth of the session that everyone leave and look at others as "bundles of potentiality." She stressed that ethics is about asking the *right* questions not about having the *right* answers.

### Group Participation

One of the exercises was to define ethics pictorially. Some of the groups had one picture; other groups had individual pictures. One particular definition was a house with a box on the inside. On the inside of the box was a question mark. The originator of the definition stated that ethics starts with self and at an early age. How-

ever, as we grow, we get boxed in to certain paradigms, roles and rules.

Another person defined ethics as brain (head) plus heart.

Still another group collectively depicted ethics as a teeter-totter. On one end was management and all the resources. On the other end, were all workers. Under one end sharp tacks were pointing upward, and under the other side were many PAC-MEN ready to gobble anyone that falls.

The group talked about trust, integrity and fairness that play into the balance that affects the teeter-totter.

After the discussion, it was agreed that ethics is the ground rules by which we live and by which people operate within the organization. Ethics deals with the fundamental human relation-



Ms. Judith Light talks to DSMC personnel on relations between people and systems.

*Dr. Hall is a Special Assistant to the DSMC Commandant for Quality. She also is an instructor in the Principles of Management Department and works on curriculum integration.*

ships, including one's relationship with oneself and one's relationship to the organizational system.

In the discussion, the word "revere" was used rather than respect. "Revere" is nonjudgmental. Another concept in ethics that is nonjudgmental is that of "allowing" one to be different rather than the concept of "tolerating differences."

The group also discussed quality, change, competition, and the ethics of caring and worth. The session ended with:

The place to begin to change the world is first in one's own heart and head and hands and then work out from there.

—Robert Pirsig

*Zen and the Art of Motorcycle Maintenance*

Ideas for encouraging further individual exploration recommended by Ms. Light include:

*Driving Fear Out of the Workplace*, Kathleen Ryan and Daniel F. Oestereich

*Quality of Else*, Lloyd Dobyns and Clare Crawford-Mason

*Caring: An Alternative Approach to Ethics and Moral Education*, Nel Noddings

*The Tao of Leadership*, John Heider

*Small Decencies: Reflections and Meditations on Being Human at Work*, John Cowan

*The Worth Ethic*, Kate Ludeman

*The Hard Problems of Management: Gaining the Ethics Edge*, Mark Pastin

*Leadership and the New Science*, Margaret Wheatley

"TQM from the Trenches: The Role of the Individual," Rolf Clark, *Program Manager*, March/April 1992

## OPERATIONAL DEFINITIONS

**Affirmative Action (AA)** - A policy followed closely by the Federal Civil Service that requires agencies to take positive steps to insure equal opportunity in employment, development, advancement, and treatment of all employees and applicants for employment regardless of race, color, sex, religion, national origin, or physical or mental handicap. Affirmative action also requires that specific actions be directed at the special problems and unique concerns in assuring equal employment opportunity for minorities, women and other disadvantaged groups.

**Equal Employment Opportunity (EEO)** - Federal policy to provide equal employment opportunity for all; to prohibit discrimination on the ground of age, race, color, religion, sex, national origin, or physical or mental handicap; and to promote the full realization of employees' potential through a continuing affirmative action program in each executive department and agency.

**Glass Ceiling** - Artificial barriers, based on biases in attitudes or in the organization, that prevent qualified individuals from advancing upward into management.

**Mentor** - An advisor who helps those with less experience to understand processes.

**Process Action Team (PAT)** - A team chartered to work on an improvement process as part of the TQM effort.

**Sexual Harassment** - Unwelcome sexual advances, requests for sexual favors, and other verbal or physical conduct of a sexual nature when:

(1) submission to such conduct is made either explicitly or implicitly a term or condition of an individual's employment;

(2) submission to or rejection of such conduct by an individual is used as the basis for employment decisions affecting such individual; or

(3) such conduct has the purpose or effect of substantially interfering with an individual's work performance or creating an intimidating, hostile, or offensive working environment.

**Upward Mobility Program (UMP)** - Systematic career development requiring competitive selection in positions that provide experience and training leading to future assignments in other, more responsible positions.

## ***Who's Bashing Whom? Trade Conflict in High-Technology Industries***

by Dr. Laura D'Andrea Tyson, Institute for International Economics Washington, D.C.  
November, 1992, 324 pps., Paperback, \$25.00. (ISBN 0-88132-106-0).

There are no easy answers to the high stakes trade issues being played out on the economic world stage. The highly visible and politically appealing bashing of Japanese cars and VCRs is certainly part of that game, but it is merely a nudge on the economic front of slowing imports to, and increasing exports from, the United States.

Referring to the book's title, "Who's Bashing Whom," the author says that "...to some degree everybody's bashing everybody," when it comes to high technology trade. Nevertheless, after reading the fine print, I'm inclined to think she believes that the United States is indeed the "bashee," not the other way around. Plus, she makes a strong, well-documented case to support her argument that we should be on the giving end for a change.

When Dr. Tyson wrote her book, she worked for the prestigious Institute for International Economics. In the meantime, she has been confirmed to be Chairperson of President Clinton's Council of Economic Advisers. She certainly is in a key position to turn some of her ideas into policy. This makes the book even more important for our trading partners, especially Japan, to read.

Dr. Tyson's problem is really with the Japanese. She takes a quick swipe at Europe early in her book, citing our clashes with Europe concerning questions of market access; overt trade barriers, like tariffs and preferential government procurement; and, the touchy subject of subsidies.

The general European idea seems clear enough however: The competitive opportunities afforded to foreign companies in the European market

should be matched by comparable foreign opportunities for European companies. This reciprocity principle appears to be emerging in U.S. trade policy so, for now, things appear on a noncollision course with our European friends.

No, Japan is definitely the problem. The author argues that the problem boils down to one of market access. Barriers to market access in Japan resist simple remedies because they are rooted in unique structural features of Japanese capitalism. She cites the case of Motorola attempting to make inroads into the Japanese cellular phone market.

Impediments occurred despite the fact the Japanese admitted in public that the Motorola cellular phone was a smaller and better mobile phone than Japanese models. Only through threats of trade retaliation by the U.S. Trade Representative in 1989 was Motorola able to establish a foothold in Japan's cellular phone market. This whole process took about 10 years and gave time for Motorola's Japanese competitors to start catching up.

This brings us to the thrust of the book—what to do. Should Japanese firms be accorded national treatment in the American market when American firms are not accorded such treatment in the Japanese market? Dr. Tyson's prescription for curing trade imbalances are what she calls "cautious activism."

She recommends that the nation's (U.S.) trade laws be used to deter or compensate for foreign practices not adequately regulated by existing multilateral rules. While Dr. Tyson makes a case that cautious activism is not the

same as protectionism, she does admit that a certain amount of arm-twisting and forceful unilateralism may be necessary. Hardly the free-market nice guy (person).

One important point Dr. Tyson presents is her philosophy for the future. She sees declining military research and development (R&D) and a need for increased government nonmilitary R&D, particularly in high-tech applications like biotechnology, semiconductor manufacturing, robotics, artificial intelligence, and high-definition displays.

She sees a growing overlap between technologies and materials with both civilian and military applications, and the continued globalization of high-technology markets.

From what we are seeing in the direction of the Clinton Department of Defense, what she envisioned in this book in November 1992 is right on track with what is happening in late 1993.

This is a well-timed and informative book. The only criticism is that it sometimes uses a lot of economic technical jargon to make a point. Because of the technical and complex nature of the material discussed, I guess that comes with the territory.

That being said, this book is definitely necessary reading for our trade representatives and our trading partners, particularly Japan. It is a strong shot across the bow for any of those partners who think they can continue to bash America. **William W. Bahnmeier, DSMC 95 Program Manager, and Professor of Principles of Program Management.**

# ATTENTION PENTAGON SUBSCRIBERS OF PROGRAM MANAGER MAGAZINE

**T**he Office of the Secretary of Defense (OSD) and the United States Postal Service (USPS) have devised a standardized DOD address format compatible with USPS addressing standards. The main purpose is to qualify DOD for processing mail on USPS automated equipment and capture potential postage discounts. The DOD address format will comprise up to five lines to include the use of a street name in the "Delivery Address Line."

Pentagon address changes were effective 30 June 1993. After 31 December 1993, all mail not conforming to the standard Pentagon format will be returned to the initiating organization.

As we go to press with this issue, we are aware of only these changes. Other DOD activities may be affected ultimately. Readers should consult their local regulations and inform *Program Manager* if they are affected.

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## Keynoter Speaks On REVOLUTIONARY CHANGES

Joan Sable

**T**he Defense Systems Management College (DSMC) and the National Contract Management Association (NCMA), Washington, D.C. Chapter, co-hosted the 1993 Acquisition Research Symposium at the Holiday Inn Crowne Plaza in Rockville, Maryland. Close to 200 acquisition personnel attended this 2 1/2-day event.

Mr. Calvin Brown, DSMC, and Ms. Donna Ireton, NCMA, co-chaired the conference assisted by program co-chairs, Ms. Joan Sable, DSMC, and Mr. Patrick Sullivan, NCMA.

BGen (Sel) Claude M. Bolton, Jr., DSMC Commandant, gave the opening remarks and introduced the keynote speaker, Mr. James McDivitt, Senior Vice President, Government Operations & International, Rockwell International.

Mr. McDivitt spoke of defining our own future. He said "the future begins now...we need to worry about decisions made today for they will affect our future. The defense department and we in industry are in the midst of revolutionary changes. It is during times of revolution that some of the biggest mistakes are made...."

*Ms. Sable was program co-chair for the Symposium and is a Technical Information Specialist in the Research and Information Division at DSMC.*



Mr. James McDivitt, keynoter, and BGen (Sel) Claude M. Bolton, Jr., USAF, DSMC Commandant.

Most of these decisions appear to be made based upon short-term consequences - like the impact on a local community of closing a depot, or the difficulty of laying off federal workers - with very little consideration to the long-term consequences."

Other plenary speakers at the June Symposium included: Mr. Thomas J. Dolan, Jr., Holder of DSMC's Acquisition Law Chair; Mr. Steven K. Conver, Vice President, Operations Integration, Martin Marietta Corporation; and Ms. Deborah L. Wince-Smith, Senior Fellow, Council on Competitiveness (former Assistant Secretary of Commerce for Technology Policy).

The second day's morning session included a Joint Logistics Commanders Panel comprising Rear Admiral Robert G. Harrison, USN; Mr. Darold L. Griffin, AMC; Rear Admiral Leonard Vincent (USN), DLA, DCMC; Mr. Ronald D. Elliott, USMC; and Colonel Harry H. Heimple, USAF. BGen (Sel) Bolton moderated this discussion. Each panelist addressed acquisition initiatives of the present and plans for the future in their respective commands. At the conclusion, panelists answered questions from the audience.

The program concluded with these two panel discussions: "The International Aspects of Acquisition,"

Photo by Richard Mattox.



Joint Logistics Commander Panel Members (left to right): Col Harry H. Heimple, USAF; Mr. Darold L. Griffin; Mr. Ronald D. Elliot; RADM Leonard Vincent, USN.

moderated by Mr. John S. Autry, Executive Vice President, Susan Davis International & Public Affairs Group; and, "The Industrial Base—Progress or Poverty?" moderated by Mr. Patrick D. Sullivan, Assistant Vice President, Procurement & Finance, Aerospace Industries Association of America.

### Industrial and International Panel Members

Members of the international panel included: Mr. Shigeo Matsutomi, First Secretary Economic Section, Embassy of Japan; Mr. Galen I. Ho, Vice President and General Manager, Merlin Programme, IBM-Aerospace Systems; Mr. Gerhard J. Lohan, Head of Trade Section, Delegation of the Commission of the European Communities; and Ms. Laura Beth Sherman, Assistant General Counsel, U.S. Trade Representative.

Members of the industrial base panel included: Ms. Ellen Brown, Professional Staff Member, Committee on Armed Services, U.S. House of

Representatives; Mr. Richard C. Barnard, Assistant Vice President, Army Times Publishing Company and Executive Editor, *Defense News*, *Space News*, *Commercial Aviation News*; Mr. Nicholas M. Torelli, Jr., Former Deputy Assistant Secretary of Defense for Production Resources; and Dr. James Blackwell, Assistant Director, Science Applications International Corporation Strategic Assessment Center.

### Acker Award

Sixty-two papers were selected for publication in the symposium book of *Proceedings*. Thirty-two of these were selected for presentation during symposium break-out sessions. This volume of papers is available upon written request to DSMC, ATTN: OS-PR, Fort Belvoir, VA 22060-5426.

Acker Skill in Communication Award recipients for outstanding papers were: USAF Major Gregory A. Garrett, Army LTC Alan S. Gilbreth, Dr. William I. Hooker, Mr. Martin I. Kestenbaum, and Dr. Ronald L. Straight.

## OPERATION FLOOD RELIEF

Volunteers from the Defense Systems Management College (DSMC), including students, are raising money for flood victims in Hamburg, Iowa. The College also is adopting the family of a DSMC soldier.

Food donated by local merchants and DSMC employees netted \$1,800 at a cookout. A bake sale netted \$555. A white elephant sale was held in late August. The College is working with the Red Cross and the Judge Advocate General, according to the DSMC personnel office.

Heavy rains and flooding from the Missouri and Nishnabotna rivers sent five feet of water through the Southwest Iowa town, forcing evacuation of 250 people.

Photo by Richard Mattox.

# DSMC PRESS BEGINS PUBLISHING TECHNICAL REPORTS

**T**he DSMC Press has begun publishing a new type of document called DSMC Technical Reports (TRs). The first, TR 1-93, *Acquiring Defense Systems*, by the late David D. Acker, will arrive from the printer in September.

The TRs are manuscripts written in-house by DSMC faculty and staff or others in the defense acquisition community such as faculty of the Defense Acquisition University member schools or Pentagon staff. The TRs are categorized as information outside of books, guidebooks, monographs, magazine articles or course materials. Examples include studies, position or issue papers, status reports, summaries of legislation or regulations, doctoral dissertations, and evaluations and critiques.

Publication of TRs expands DSMC's research and information dissemination mission into a wider customer

service base, and provides increased opportunities for acquisition professionals to publish.

Printing is limited to several hundred copies, most of which are distributed to the DSMC library, other Department of Defense and government libraries, selected university libraries, and the Defense Technical Information Center (DTIC) and the National Technical Information Service (NTIS). Multiple copies can be obtained from DTIC and NTIS.

Other manuscripts selected as TRs are: Dr. Robert Warren's University of Southern California doctoral dissertation, "The Impact of the Undersecretary of Defense (Acquisition) on Defense Science and Technology: An Organizational Culture Study"; and C. B. Cochrane's "Summary and Assessment - Acquisition Policy Implications: National Defense Authorization Act for FY-1993, and

Department of Defense Appropriations Act for FY-1993."

Interested authors can submit manuscripts for consideration to:  
DEFENSE SYST MGMT COLG  
ATTN RDP ESTHER FARRIA  
9820 BELVOIR ROAD  
SUITE G38  
FT BELVOIR VA 22060-5565  
703-805-3056; DSN 655-3056

The Policy and Authors' Guidelines are on this page. Because of the special nature of the work by Acker, former DSMC archivist and historian, an exception has been made to the policy regarding a standard cover and no illustrations.

With the possible exception of the Acker TR, the DSMC Press has no plans to market TRs through the U.S. Government Printing Office.

**Wilbur Jones**

## POLICY AND AUTHORS' GUIDELINES

- TR manuscript topics shall relate to defense acquisition.
- Authors must submit manuscripts to the Director, DSMC Press, for publication consideration. No prearrangements are required. Following necessary peer review, the decision to publish is the Director's.
- Authors are responsible for internal staffing and approval, accuracy, completeness and editing. The Press staff provides counsel regarding structure and composition.
- Authors accepted for publication should provide the DSMC Press with a hard copy of the manuscript, preferably single-spaced, and a labeled IBM diskette with the manuscript in WordPerfect Version 5.1.
- No word or page limit is required, but authors must aim for no more than 50 single-spaced pages.
- Illustrations, except for charts to support text, are not recommended. Foldouts are prohibited.
- The DSMC Visual Arts Department (OS-VA) provides a standard black-and-white cover without illustrations showing the title, author, TR number and DSMC logo and similar title page.
- The TRs are printed by the DSMC Printing and Duplicating Services Department (OS-PR) in a run of 200 copies (head-to-head), on an as-received basis depending on workload.
- External distribution by OS-PR includes DOD and other government libraries, selected university libraries and other repositories, the Defense Technical Information Center, National Technical Information Service, and limited on-demand requests.
- Authors may register and own the copyright to material prepared on their own time.
- Exceptions to this policy will be on a case basis.



## **PMC HIGHLIGHTS**

### *419 Graduated in June*

*Lt Col Matt Gillis, USAF*

**T**he Program Management Course graduated 419 successful students from PMC 93-1 on June 11, 1993. Two "firsts" occurred for this graduation: The first husband and wife team in the PMC class graduated together; Major Toni Arnold, USAF, and Mr. Mike Niggel, SAIC Corp. The first "legacy" student also graduated in this class; Mr. Bob Steele, who received his diploma from his father, Mr. Bill Steele, a graduate of PMC 77-2.

During the remainder of June and early July, the division was busily preparing to receive the new class. CAPT Steve Kupka, USN, the Executive Director of the Program Management Education Division for the last 2 years, retired July 30 and moved to Bound Brook, New Jersey.

After a short respite, we welcomed 421 students (a new record) for PMC 93-2, which began July 26. Not to be

*LtCol Gillis is the PMC Course Director at DSMC.*

outdone as "firsts" by the last class, CAPT Kate Paige, USN, is the first section leader whose spouse was a section leader in an earlier PMC class.

After a harrowing but short experience with the PMC Pre-Test, the class is off and running and reading. Some details on the class composition follow:

- Average Age, 41 years
- Average Acquisition Experience, 10 years
- Average Rank, (for military) O-5
- Average Grade (for civilians), GM-14.

PMC 93-2 is 48 percent civilians and 52 percent military. In addition to the usual DOD students, we have 2 Coast Guard students, 14 Industry students, and 1 Allied exchange student from Turkey.

This class offers a diverse and experienced background. We look forward to a great experience in learning the intricacies of Defense Department Acquisition Management.

## **DTIC USERS TRAINING**

The Defense Technical Information Center located at Cameron Station, Va., will sponsor its annual Users Training Conference November 1-4, 1993. It will be at the Stouffer Concourse Hotel, Arlington, Va., and features the theme, "Information and Technology Teamed for Success." For further information, contact Ms. Patti Miller, (703) 274-3848.

## **ICAF AND DSMC SIGN MEMORANDUM OF AGREEMENT**

On June 23, 1993, an unprecedented memorandum of agreement (MOA) was signed between the Industrial College of the Armed Forces (ICAF) and the Defense Systems Management College (DSMC). The ICAF sponsors the DOD designated Senior Acquisition Management Course (Level III) and DSMC sponsors the Program Management Course (Level II)—both under the auspices of the Defense Acquisition University consortium.

The purpose of the MOA is to promote improved communications, cooperation and understanding between ICAF and DSMC as a means of improving their respective educational curricula and enhancing the execution of their respective College missions.

Specific facets of the MOA provide for periodic meetings and exchange of materials to promote understanding of each other's curricula, educational methods, and research endeavors. The ICAF and DSMC will continue to utilize selected faculty to serve as guest lecturers/instructors in each other's respective courses of instruction.

The MOA also provides for regular exchange of qualified faculty to serve as students in ICAF and DSMC respective courses of instruction. As a first step toward this goal, DSMC faculty member Paul McIlvaine will be a student of ICAF's upcoming Senior Acquisition Management Course.

# FROM THE COMMANDANT

## *Changes at DSMC*

**I**n my first chat with you, I indicated many changes and challenges were ahead for all of us in the acquisition business. Well, during the last four months, many changes have taken place and indicate an interesting future.

As you may have noticed in the July-August 1993 *Program Manager* magazine, a quick scan of the table of contents tells the story. Articles indicating change included "Dr. Deutch Restructures Defense Acquisition Organization, Acquisition Law Panel Reports to Congress, and Helping Our Customers." Each of these articles described changes which either directly or indirectly have significantly impacted the Defense Systems Management College (DSMC).

I won't repeat these articles but I encourage you to read them if you have not already.

I would, however, like to highlight changes and activities DSMC has experienced since I last spoke to you.

First, as indicated in the July-August *Program Manager* magazine, DSMC and DAU (Defense Acquisition University) now reside organizationally under the newly formed Deputy Under Secretary of Defense for Acquisition Reform. Mrs. Colleen Preston has been confirmed as the Deputy Under Secretary of Defense to head the new Acquisition Reform Office. Mrs. Preston is well acquainted with DSMC and acquisition.

She spoke to several of our DSMC classes in the past and, while working in the House of Representatives as general counsel, she was a key in drafting the Defense Acquisition Workforce Improvement Act. She was deeply involved with the Section 800 Panel review and has hit the ground running in the acquisition reform office. We are extremely pleased and fortunate to be working for Mrs. Preston and look forward to working with her and the Reform Office staff.

Other changes at DSMC include an initiative to review our flagship acquisition course, PMC (Program Management Course). This review is called DSMC 95 and is essentially a bottoms-up review. We start by talking with our customers and stakeholders to see whether or not we are teaching what is required. Once we have established this requirement in terms of desired competencies, we will review and change our PMC curriculum as required. The final step will be to ensure the DSMC organizational structure supports this curriculum and, in turn, our customers.

Some customer inputs received thus far include reducing course length dramatically, increasing course topic integration, incorporating integrated product team concepts, strengthening/ incorporating software management, establishing PMC prerequisites, increasing multinational emphasis, incorporating commercial practices topics, incorporating acquisition reform initiatives, etc.

As you can see, we have a number of topics to consider. We will be talking to many of you in the weeks ahead on how to improve PMC and how to ensure PMC is totally responsive to field requirements. I encourage you to drop me a line if you have anything you'd like us to consider as we improve our PMC.

There are many other changes I'd like to discuss with you but time does not permit. We will do our best to keep you abreast through this and future issues of *Program Manager* magazine. Until then....

—BGen (Sel) Claude M. Bolton, Jr., USAF